April 6, 1964

NOTES 4-6-64 BELEW B 4/10

H-1 ENGINE PROGRAM

The second Coast Metal 62 thrust chamber has satisfactorily completed 1747 seconds of engine testing at 200K. Eight H-1 engines have been subjected to 182 tests for a total of 22,116 seconds at thrust levels at or above 200K. Testing of the redesigned 200K hardware main propellant valves and high pressure LOX duct began during this report period.

F-1 ENGINE PROGRAM

A full-duration run (150 seconds) was made on March 30 with both a heat exchanger and skirt extension. This is the first time these two components have been tested together during engine firing. Test results were as predicted.

Test Stand 1B-2 is ready to resume testing following the engine 014 LOX pump explosion of February 28. Stand modifications to provide compatibility with flight configuration engines were also incorporated.

The second F-1 ground test engine, F-1002, was delivered to MSFC on April 1.

RL10 ENGINE PROGRAM

Latest personnel reports from Pratt & Whitney indicate a decrease in total RL10 project direct and indirect personnel of 40 percent since November 1963. Total employment in November on this project was 2,143. Latest number reported is 1,286; a reduction of 857 personnel.

Lee But let's hang on to P&W. With our cryogenic projects we'll have a comeback shortly! B

J-2 ENGINE PROGRAM

Complete incident reports on thrust chamber test stand (VTS-1) explosion and the Delta-2B test stand gimbal structure inadequacy have been issued. (Copies were sent to you April 3.) The VTS-1 stand will be down for approximately 2 weeks. The Delta-2B position is not down but cannot be used for gimbal testing until some structural rework is accomplished. Engine 2003, scheduled for the S-IVB battleship program, will be approximately 2 weeks late in delivery (April 15). Rocketdyne's 14 to 1 thrust chamber program proposal is expected in our office the week of April 6.

Negotiations with Rocketdyne of the overrun and extension of the development effort were completed on April 3. Negotiations of the production contract are expected to begin April 13.

B 4/10

NOTES 4-6-64 CLINE

1. S-II LH_2 TANK INSULATION: The insulation evaluation was accomplished by 4-1-64 with the following conclusions:

a. The Space and Information Systems Division (S&ID), North American Aviation, Inc., vacuum concept cannot be recommended.

b. The double seal concept requires further testing.

c. Removal of foam from the 1.6-inch thick insulation is to be investigated.

d. S&ID must be requested to prepare material and process specifications for the double seal. ✓

2. S-II UMBILICALS: S&ID has come up with an H_2 vent coupling disregarding existing specifications and effects on other Ground Support Equipment. S&ID has been requested to design a coupling in accordance with established specifications. ✓

3. NASA HAZARDS ADVISORY BOARD: (Reference NOTES 3-9-64 MRAZEK, paragraph 4.) This Laboratory has not been requested officially nor unofficially to review the NASA Hazards Advisory Board proposed charter.

→ Fred C.
Suggest you send the Board a formal request to be given an opportunity to review its charter because of far-reaching effects on our entire program. I'll sign it for the Center. Let's pass it to the Board thru Dr. Mueller's office
B

Attachment #1: NOTES 3-9-64 MRAZEK

NOTES 3-9-64 MRAZEK

1. LOX PUMP EXPLOSION: On 2-20-64, a LOX pump explosion occurred on R&D engine 014. The pump had approximately 1,400 seconds of runtime, 1,300 seconds of which were for engine testing. The explosion occurred after 110 seconds of mainstage. The LOX discharge pressure rose sharply four milliseconds before the explosion. All other parameters appeared normal with the exception of a change of Direct Current trace 270 milliseconds observed on a radial accelerometer on the turbopump before the explosion.

Testing has been discontinued both at Edwards Air Force Base/Rocket Site and MSFC until definite conclusions are reached.

2. S-IVB CONTINUOUS VENTING: Douglas Aircraft Company's study confirms technical feasibility of a continuous venting system for the S-IVB and shows a potential payload gain of 1,900 pounds.

3. S-II PROCESS SPECIFICATIONS: Review of North American Aviation, Inc. (NAA) process specifications was held 3-3/6-64. All top priority NAA process specifications have either been reviewed or are scheduled for review. The next review meeting is scheduled for 3-17/18-64.

The conference method is very favorable when programmed far enough in advance to allow time for in-house reviews to be made and to adjust the laboratories' workload to accommodate the scheduled conferences.

4. NASA HAZARDS ADVISORY BOARD: (Reference NOTES 2-17-64 MRAZEK, paragraph 2.) We have obtained, unofficially, a draft copy of the charter of this proposed Board.

5. CRYOGENIC SPACE PROPULSION UNIT/SATURN V UPRATING: Saturn V launch vehicle data were prepared for Mr. L. Fero, Office of Manned Space Flight, to assist in evaluating a Cryogenic Space Propulsion Unit within the framework of an Apollo mission insurance program. Data included present performance, present weight savings programs, and payload exchange ratios for various parameters. Possible Saturn V improvement programs were presented, including larger stages with higher thrust engines, earth orbit rendezvous using Saturn IB and Saturn V launch vehicles, fluorine oxidizer stages, and the Cryogenic Space Propulsion Unit based on the Multi-Mission Module configuration. The Earth Orbital Rendezvous profile was requested by Mr. Fero. Facility limitations were discussed, and cost and schedule estimates of a possible improvement program were presented. KSC submitted separate cost and facility information as affected by the proposed configurations. Due to the limited time available for study, all numbers were qualified as preliminary estimates only.

6. PROPOSED LOX DEPLETION FOR SA-6: Aero-Astrodynamics Laboratory has recommended LOX depletion from S-I-7 or S-I-9 be installed in S-I-6. New fuel depletion sensors must be installed. Qualified sensors will not be available until 4-1-64. Resolution to the problem is expected within one week.

7. SA-201 INSTRUMENT UNIT MOCKUP PROGRAM: The environmental system design is 75% completed.

Attachment #1: Charter (Copy attached for Dr. von Braun only)
Attachment #2: NOTES 2-17-64 MRAZEK

Attachment #1

NOTES 4/6/64 CONSTAN

B 4/10

1. BOEING QUARTERLY REVIEW

The third Saturn V, S-IC Stage, FY 64 Quarterly Technical Progress Review will be held at Michoud Operations on April 23 & 24, 1964. ✓

2. STATUS OF S-I-8

Final acceptance testing of S-I-8 is complete and the vehicle has moved into the modification area. At the completion of the minor modifications that are required to be performed, the vehicle will be prepared for shipment to Huntsville. The proposed loading date of the vehicle on the shipping barge is now April 17, 1964. ✓

NOTES - April 6, 1964 - DANNENBERG B 4/10

1. Instrument Unit Cabling Problem - The decision has been made and coordinated with MSC that cantilevered cable brackets extending from the IU into the adapter will be added for proper separation of critical cables. Total weight penalty - 203 lbs. KD Saw the mockup and liked it very much B

2. Gemini Pre-Launch Review - S/C and L/V are "go" for Wednesday, 11:00, except for a rate gyro package which malfunctioned and has been replaced without finding the cause of the malfunction. ✓

At a dinner in honor of Walt Williams which Dr. Farish attended, the astronauts appeared much disturbed about Walt Williams' leaving. Deke Slayton in a speech stated that W. W. is indispensable and cannot be replaced. In informal conversations after dinner, Schirra was bitter about the treatment W. W. received by NASA.

KD Suggest you bring this to Kurt's Debus attention B

3. Crew Safety Panel. Meeting in Huntsville attended, among others, by Slayton and Borman made the following decisions.

a. Structural monitor by break wire will be dropped for IB and V. ✓

b. Double cue will be required for any manual abort action. ✓

c. Except for the liftoff phase, on-board information will take precedence over any ground TM information prior to manual abort. ✓

d. Engine out capability for IB and V for alternate mission (as opposed to abort) looks promising enough to be investigated thoroughly. ✓

4. PDP for Centaur Third Stage. Work has started for preparation of a PDP to be reviewed by you prior to May Management Council Meeting. ✓

versus a solution that wasn't one! B

B 4/10

NOTES 4/6/64 FORTUNE

Bill Next time I'd like to go first class, too. (time permitting) B

1. Brigadier General (Select) Wilhoyt Replacing Brigadier General Hayes as Deputy Chief of Engineers for NASA Construction: and a dozen other Corps people, Bernie Tessman, J. T. Shepherd, Dick Cook, Marion Kent, plus other MSFC representatives visited MTO Thursday. They toured Michoud early, then boarded the Engineer Survey Boat at Pearlington, cruised up the East Pearl River to our construction dock with lunch enroute. We briefed them in the Corps of Engineers Headquarters Building, then spent about two hours on tour. Roads were in good condition and all sites including several new ones very active.

2. Bi-Weekly MTO/MTSO Management Meeting: was held Friday morning here in the MTSO Conference Room. Henry Auter presided; our key personnel and GE's respective managers attended. Construction Schedules, Activation, GE indirect labor and relocation costs, and manpower needs and allocations at MTF were discussed.

3. Corps Plan for Cemetery Relocation: was subject of meeting that same day. Ed Guilian, Marion Kent, Jim Leslie, from Huntsville; Ed Ling, from Michoud; O. B. Moore, from the MDO Real Estate Office and myself presented viewpoints to Mr. Lynn Jacobs from NASA Headquarters. Mr. Jacobs came from Washington to determine what was best for NASA's community relations. I believe all finally agreed that, since the Corps had gone so far in their negotiations with relatives of those interred in the cemeteries that could be located, this disinterment should be carried out. The cemeteries have long been is disarray, the relatives seemed to prefer the move to newer and more accessible burial places, and retention of cemeteries within our fee area would have presented operating and maintenance problems. Jacobs indicated that De Wyatt had taken over real property management from Jack Young.

B 4/10

NOTES 4/6/64 GEISSLER

1. Orbital Lifetime SA-6: A lifetime analysis for SA-6 with active guidance resulted in the following: Nominal apogee 229 km; perigee 183 km; lifetime 4.8 days. A 2 σ vehicle performance dispersion results in only ± 0.3 days lifetime variation due to guidance. However, general prediction uncertainty leads to a possible maximum lifetime of 12 days and a minimum of 1.4 days. ✓

Bart S. The short expected lifetime should be announced in advance. B

2. Flight Evaluation Panel: The first panel meeting was held in Huntsville on March 26. MSC presented their approach to engineering flight evaluation. Progress was made in coordinating MSC-MSFC data requirements from KSC. No major problems at this time (see action items attached). ✓

3. Flight Evaluation SA-5: The flight evaluation report for SA-5 has been completed 53 working days after launch (average Block I: 45 days). ✓ Distribution will be made on April 7. ✓

4. Briefing of Lewis Personnel: Upon request a two day briefing on MSFC flight evaluation and reduction methods was given here on 3/30 to five representatives of the Centaur evaluation team from LeRC under Mr. Braithwaite. It appears that LeRC will adopt several of our approaches in this area. ✓

5. American Geophysical Union: Two presentations by Aero-Astrodynamics Laboratory personnel will be given at above organization's April 21-24 meeting in Washington, D. C. Titles and authors: "Proposed Solution to the Geomagnetic Anomalies in the Ionosphere" by Mr. William Roberts, and "An Evaluation of Various Geomagnetic Field Equations" by Mr. Harold Euler. ✓

6. Saturn Orbital Debris Committee: At third meeting of above committee at MSFC on March 26, Lockheed presented a preliminary design of a retro system for the Saturn IB/S-IVB + IU stage, and the analysis of retro systems applicable to the Saturn V/S-IVB + IU stage. Based on study ground rules and the resultant evaluation studies, Lockheed chose to use five XM85 solid propellant motors for the Saturn IB Orbital Debris Retro System. MSFC agreed with Lockheed's approach, but felt that their preliminary retro system weight estimate of 882 lbs was not conservative enough, since we believe it will increase during the development phase. Decision to delete ullage rockets from Saturn V APS may rule out use of APS for Saturn V Debris Retro System. Further studies on this subject are required. ✓

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

R. B. Teasley/876-3570
DATE March 31, 1964

TO : Distribution

FROM : MSFC Co-Chairman, Apollo Flight Evaluation Panel, R-AERO-F

SUBJECT : Action Items Initiated at First Meeting of Apollo Flight Evaluation Panel

The following action items were initiated at the first meeting of the Apollo Flight Evaluation Panel, held at MSFC on March 26, 1964.

1-KSC-1 KSC (Mr. Collins) will announce the date of a splinter meeting to be held at KSC for the purpose of identifying and recommending solutions to problems associated with compatibility of SA-6 data requirements from MSC and MSFC. Participants will be invited from MSC, MSFC, GSFC, and KSC. This action is to be accomplished by April 2, 1964. (Action accomplished. Meeting to be held on April 1, 1964)

1-MSC/MSFC-2 MSC (Mr. Goldenbaum) and MSFC (Mr. Emanuel) will forward to each other a complete list of their respective centers' data exchange requirements for SA-6. Complete instructions including preferred formats are to be specified. This action is to be accomplished by April 9, 1964.

1-MSFC-3 MSFC (Mr. Ely) will forward to MSC a complete list of measurements carried on the SA-6 booster by April 2, 1964.

1-MSC-4 MSC (Mr. Goldenbaum) will transmit a listing of preferred data sampling rates to MSFC by April 2, 1964. (Action accomplished immediately after conclusion of meeting).

F. Speer

F. A. Speer

NOTES 4-6-64 GRAU

B 4/10

1. S-I-7 POST-STATIC CHECKOUT: Post-static checkout of the S-I-7 stage continues in Station B of building 4708. Instrumentation Checkout is approximately 40 per cent complete.

2. S-IU-7 CHECKOUT: Instrumentation checkout of the S-IU-7 Instrument Unit is in progress and is approximately 50 per cent complete.

3. S-IV-7 PRE-STATIC CHECKOUT: After repeated unsuccessful sample runs on the hydraulic system for the actuator on engine number 6, it was decided that the actuator would be replaced. This action, combined with other modifications which are being delayed due to missing components, appears to have delayed the static firing date from April 15 until sometime after April 20. The planned shipment date to KSC remains June 1. Considering the time required for cleanup and movement of the stage to the Engineering and Development Building, about one month will be left for post-static checkout.

4. S-IV-9 POST-MANUFACTURING CHECKOUT: During the past two weeks, little or no progress has been made on final post-manufacturing checkout of the S-IV-9 stage due to shortage of parts. Two test procedures are not yet approved by MSFC - TM/Instrumentation Compatibility and Simulated Flight Test.

5. PROCUREMENT REQUEST QUALITY REQUIREMENTS REVIEW: Reference is made to your question concerning Paragraph 4 of my NOTES 3-9-64 (copy attached). The message is: This proves that the people reviewing procurement requests impose quality requirements only on those requests which cover the vital equipment, i.e., flight hardware, potential flight hardware, and equipment and parts directly connected with the test checkout, and launch of the vehicles which amounts to less than 13 per cent of the total number of procurement requests, and that NPC 200-2 and NPC 200-3 are invoked very sparsely, in not even 1 per cent of the number of requests. (There is nothing wrong, and no need for corrective action; to the contrary, this area appears to be in good shape.) The reason for bringing this to your attention is that criticism is often heard that the quality documents are indiscriminately imposed on contractors.

6. S-IV-6 CONTAMINATION: During sampling of the hydraulic oil of S-IV-6 at Kennedy Space Center, it was discovered that the systems sampled were contaminated. All systems must be cleaned prior to flight.

1 Enc:
Attachment (NOTES 3-9-64 GRAU) (Dr. von Braun's copies only)

NOTES 3-9-64 GRAU

1. S-I-7 POST-STATIC CHECKOUT: Post-static pressure and functional testing of the S-I-7 stage continues in the pressure test cell of building 4705.

2. S-IU-7 CHECKOUT: The S-IU-7 Instrument Unit is now undergoing electrical checkout in Station "D" of building 4708. Due to the late arrival of the ST-124 Stabilized Platform, Platform Electronics Box, Flight Control Computer, Control Accelerometer Switch, Minitrack Transmitter and Guidance Signal Processor, this Laboratory is investigating the possibility of modifying the S-IU-7 schedule to allow for complete systems checkout.

3. SYSTEMS CHECKOUT WORKING GROUP MEETING: The Systems Checkout Working Group held a meeting at KSC on February 17-18 to discuss and resolve problems raised by KSC's proposal to curtail low bay pre-mate stage checkout in the Vertical Assembly Building. The Working Group recommended that MSFC adopt the proposal and agreed upon guidelines to be followed in implementing same.

4. PROCUREMENT REQUEST QUALITY REQUIREMENTS REVIEW: Between September 28, 1963 and February 11, 1964, the following disposition was made of procurement requests from MSFC Laboratories:

		% of Total
TOTAL NUMBER OF REQUESTS	17,473	100.00
Inclusion of NPC 200-2 (one request of 4.75 million dollars value to Allis Chalmers for fuel cell power supply systems, one request of 9.2 million dollars value to Bendix Corp., Eclipse-Pioneer Division for ST-124 stabilized platform design, documentation, and prototype fabrication)	2	.01
Inclusion of NPC 200-3	129	.74
Inclusion of In-Process Inspection	153	.88
Inclusion of Quality Requirements (such as workmanship, or military specification)	1866	10.68
Untouched (not flight hardware or GSE, but laboratory equipment, stock replenishment, office equipment and supplies, study and construction contracts, and various supplements)	15323	87.69

Due to the method used by the Financial Management Office in the accounting of procurement requests, an estimate of the dollar value to be attached to these figures cannot be obtained without considerable effort.

5. S-IV/S-IVB ORIENTATIONS: A series of orientations were given to S-IV/S-IVB Industrial Operations personnel on the planning and activities of the Quality and Reliability Assurance Laboratory in regard to the S-IV and S-IVB programs. These orientations were designed to explain to Industrial Operations the nature and extent of our participation in these programs, and to define in moderate detail the quality and reliability requirements which must be applied in order to assure quality stage systems hardware.

NOTES 4-6-64 GRUENE B 4/10

1. SA-6 Status

a. RCA-110 Computer controlled automated overall test was run successfully April 3 after a number of last minute changes in the program which had to be made. ✓

b. The S-IV-6 was electrically mated to the launch vehicle over the weekend. ✓

c. The spacecraft was assembled last week on the pad. No mating performed yet. ✓

NOTE: The following item should not be included in Notes to Dr. Mueller.

2. Cancellation of MSFC/KSC Charter Service: Mr. McCullom (Young's Office, NASA Headquarters) recommended to Mr. Webb that in case Eastern Airlines promised a satisfactory schedule sometime during FY-65, the present charter flight should be cancelled as of July 1, 1964. In the recommendation, it is stated that KSC does not concur in the cancellation but that, "MSFC management would generally prefer Eastern service." I cannot understand this statement because we were made to believe that Marshall was also in favor of our charter service. I believe that cancellation of the charter flight would make the present close relationship between MSFC, LVO and KSC much more difficult. Advantages of the charter flight are:

Dave 22 B

a. We proved it more economical than commercial flights.

b. Schedules are changed to accommodate special cases (extended meetings at MSFC and the Cape, pre-flight participation of MSFC personnel at the Cape for operational tests, etc.

c. Special cargo can be taken from the laboratory or workshop to plane without packing required and in emergency cases, the plane can be delayed to wait for readiness of critical components (e.g., tubing with exchanged sleeves on SA-5, guidance computer changes, etc.

d. If commercial travel becomes necessary at this time, each laboratory would have to pay for the plane tickets os the cost of a one-day trip for one man would change from $16.00 (per diem) to almost $100.00 (per diem plus air fare). I doubt seriously that Headquarters would take the money saved out of the cancelled charter contract and add it to the presently authorized travel funds for this purpose. This very probably would restrict the desirable travel between the two centers.

Dave Please let me know what came out of your talks with Hans Gruene. B

I will send you a more detailed justification in a few days, but I would appreciate very much your mentioning your concern to Mr. Webb.

NOTES 4/6/64 HAEUSSERMANN B 4/10

1. SA-9 SCHEDULE PROBLEM: (Previously reported in 3/9 and 3/23 Notes) Ninety percent of theoretical elastic body data, for control gain and shaping network determination, has been received. Based on 6/8/64 as the required release date in order that G&C Division can meet present hardware schedules, Flight Dynamics Branch is allotted 10 weeks to perform a task normally considered for 16 weeks. Every effort will be made by Flight Dynamics Branch to make up for the 6 weeks delay in theoretical data delivery by R-AERO. ✓

2. AROD TRACKING SYSTEM: OMSF comments to MSFC Tracking Study of 4/2/64 may effect the possibility of flight test of AROD in the Saturn IB R&D vehicles. Our intention is to test this system in support of OTDA and as a result have it available for future Saturn flights should a positive need develop. Funding for this project has been provided by OTDA, and it will be flown on a non-interference basis. OTDA is intending to coordinate flight test plans with OMSF. ✓ Procurement request for 3.3M for prototype phase was ready for release 4/1 but delayed to 4/3 to verify coordination being accomplished in Headquarters. This contract will be competitive. ✓

WH. I'm in favor of these kind of free-ride deals; they are the only sound way to advance technology; good topic for Dr. Mueller's visit here 15 Apr! B

3. HORIZON SENSOR: Technical impact of Dr. Mueller's removal of the Horizon Sensor from the R&D vehicles is being studied by R-AERO (Dr. Speer) and ASTR. I think we didn't have a very strong case here. Or do you disagree? If so:

4. AUTOMATION PROGRAMING SUPPORT: Some misleading impressions may have been made in the automation presentation concerning the overall indiscriminate utilization of a large number of contractors to support the automation programing effort. G&C Division and LVO are using solely IBM in the generation of programs for launch site operations. One additional contractor, RCA, furnishes programing support to G&C Division in the field of RCA-110 computer system diagnostic routines. It is desirable to use RCA in the latter capacity, since intimate familiarity with the hardware is necessary. Although some GE-Apollo support was utilized in the above areas in the past, this effort is being discontinued. ✓

5. STUDY OF ROLL ATTITUDE ERROR: R-AERO wind tunnel tests indicate that a roll attitude error of 7 degrees might develop because of a roll torque created by unsymmetrical mounting of exhaust nozzle fairings. Analog simulation with the flight control computers shows that stability limits and transient response are unaffected by this error. Studies made by R-ASTR-ND show that the trajectory perturbation is not significant compared to other expected perturbations, therefore, it appears that this roll effor will not create any problems. ✓

It's Fichtner's show! I hope he uses common sense and good judgement B

6. STATUS REPORT - ATTITUDE MOTION SIMULATION FACILITY: A contract was signed on 3/4 with Lockheed to design, build, integrate, and test the instrumentation for the Attitude Motion Simulation Facility in the Computation Laboratory. Preliminary breadboard work on the servo and optical systems has begun. All GFP listed in the contract have been delivered to Lockheed. ✓

7. ITINERARY FOR WEEK OF 4/6: I will be in New York City 4/6-7, 2nd Joint NASA/FAA/DOD Guidance and Navigation Symposium; in Washington 4/8-9, Steering Committee Meeting of the NASA Research Advisory Committee for Control, Guidance and Navigation and will greet new employee arriving from Germany, Mr. N. Neudatschin; and 4/10 with Dr. Buchhold, GE Schenectady. ✓

B 4/10

NOTES 4/6/64 HEIMBURG

1. S-IC-T INSTRUMENTATION DELIVERY SCHEDULE: Reference NOTES 3/9/64 CONSTAN (copy attached). The slip in the delivery schedule for the Liquid Level System was recognized previously. A procedure has been worked out with Manufacturing Engineering Laboratory and Boeing whereby a Liquid Level System can be provided on the S-IC-T with no delay in the firing schedule. The Liquid Level System used may not necessarily be the same as in the flight vehicle; however, it will give an accurate measurement.

2. F-1 ENGINE TESTING (STATIC TEST TOWER WEST): Reference NOTES 3/16/64 HEIMBURG (copy attached). The 10-32 bolt and washer are parts from the suction line internal gimbal bellows which is utilized on the test stand at Edwards Air Force Base. We assume that the bolt and washer came loose and went through the pump while the engine was at Edwards Air Force Base. This assumption is based on the fact that the gimbal bellows are utilized only on the test stand at Edwards Air Force Base.

There were no F-1 engine firings during the week of 3/30, because we were investigating the two percent performance increase of the engine following engine tear down and reassembly for the 3/24 firing. A beefed-up lox inlet assembly was the only major hardware change during this reassembly. This lox inlet assembly has a different internal high pressure bleed arrangement; however, Rocketdyne stated that this did not cause the performance increase.

The gas generator fuel injector was removed from the engine and flow checked to verify the correct pressure drop. No foreign particles were found in the injector that would cause a mixture ratio shift therefore resulting in high performance. Test Laboratory believes that the performance increase does result from the lox inlet assembly change, because there may be less turbulence at the lox pump inlet. One test will be run on 4/8 to obtain additional baseline data since the gas generator fuel injector has been removed and flow checked. During the week of 4/13, the old lox inlet assembly will be installed in the engine in order to verify the new assembly as the reason for the performance increase.

3. ACOUSTIC LEVEL RESULTING FROM SATURN S-I STAGE AND F-1 ENGINE TESTS: On 3/24 during Mrs. Johnson's visit, an S-I stage and an F-1 engine test were run in sequence. A preliminary study of the acoustic data gained from these tests has shown that there is little difference between the two when considered as noise sources. As shown on Figure 1, both the S-I and the F-1 show an overall sound power level of approximately 204 decibels or about 40 million watts. The spectra are nearly identical and both peak at 1,000 feet in the 31.5 octave band.

The variation of overall sound pressure levels as a function of range is shown on Figure 2. These data appear to have answered the question of test stand directivity. The difference from front to back may now be said to be 10 decibels in the 6-16 kilometer range.

Very interesting! B

ATTACHMENT 1: NOTES 3/9/64 CONSTAN (attached to Dr. von Braun's Copy Only)
ATTACHMENT 2: NOTES 3/16/64 HEIMBURG (attached to Dr. von Braun's Copy Only)

NOTES 4/9/64 CONSTAN

1. SI

The final acceptance testing of S-I-8 is continuing. Overall testing is approximately 72% complete. The remaining tests to be completed are Cutoff Test, T. M. Calibration, and Simulated Plug-Drop. The estimated date of completion of final acceptance testing is March 19, 1964. S-I-10 is scheduled to move into final checkout as soon as S-I-8 is removed.

2. S-IC

The Boeing manufacturing drilling operations have been of an unacceptable quality level. In order to correct this condition, a meeting was held with Boeing's Quality Control Management. Boeing initiated action to preclude increase in percent defective ratios in hardware drilling operation.

3. S-IC-T Instrumentation Delivery Schedule

Presentation by Boeing (Mr. Bogart) on March 6 on S-IC-T Instrumentation Delivery Schedule indicates a delivery slide from April 1964 to November 1964 of the Liquid Level System. This slide is a result of a vibration specification change as impacted by the vendor (Transonics). This specification change was requested by MSFC. Manufacturing Engineering Laboratory required date is April 1964. This problem is being brought to Huntsville for coordination and resolution.

4. Modification 62 to Contract NAS8-5608 (Boeing)

Modification 62 is in NASA Headquarters for evaluation. This Mod is for support to MSFC which is accomplished by individual Task Assurance Orders. The effort is being extended by Mod 62. Headquarters is questioning whether this Mod is a sole source justification for SATURN V work to the Boeing Co. and is further questioning whether this is a personal service contract. Both of these questions have been discussed with NASA Headquarters and we have furnished assurance that this Mod has no intention of establishing sole source justification for the SATURN V mission support. We have further advised NASA Headquarters that this effort is not personal services since it is support to MSFC in the areas of inter-related activities for the S-IC program for which both MSFC and The Boeing Co. have designated responsibilities.

5. Support Services Contractor - Mason-Rust

The existing contract between the support services contractor, Mason-Rust and the Metal Trades Council has been extended from midnight, March 3, 1964 to midnight March 18, 1964. The Metal Trades Council has agreed to resubmit this proposed contract offer made by the Mason-Rust Co. to their employees for gratification. This proposal was submitted earlier and rejected by the membership of the Metal Trades Council. The Metal Trades Council feels that with better explanation to the members that they will accept the proposed contract. The voting for the possible radification of the contract will be accomplished on Thursday, March 12, 1964.

attachment 1

B3/25

NOTES 3/16/64 HEIMBURG

1. F-1 ENGINE TESTING (STATIC TEST TOWER WEST): Due to the present plans for an F-1 engine test on 3/25, the lox impeller for engine F-1001 was returned from Rocketdyne, Canoga Park. A new lox pump seal (the old seal appeared to be approaching failure) has been installed, and the lox pump has been reassembled. The lox dome and injector were removed from the engine, inspected, and reassembled. The turbine has been assembled, and the engine will be installed in the test stand today, 3/16. A shake-down firing is scheduled for 3/20.

Inspection of the lox pump during disassembly found a 10-32 bolt and washer in the lox dome. This hardware is a part of the Rocketdyne suction ducting. It is assumed that the impeller damage ((discussed in the 3/9/64 Notes--copy attached)) was caused by the passage of the bolt and washer through the pump. It was also noted that the turbine blades had minor erosion only, with several cracks perpendicular to the blades.

2. S-I-9 (SA-18): A 35-second mainstage firing of the S-I-9 stage was successfully performed on 3/13. This was the initial test performed entirely by Chrysler personnel. Preliminary evaluation of data indicates that all systems performed satisfactorily. Data evaluation and hardware inspection are presently underway.

The initial attempt to fire S-I-9 on 3/12 had to be scrubbed. During the final countdown, while lox tank pressurization was in progress, cutoff was inadvertently given by a redline observer. The command to reset was given; however, the panel operator pushed the console cutoff button instead of the reset button, which resulted in firing of the Conax valves. The necessary rework required three hours, by which time the test had to be cancelled due to adverse weather conditions.

3. S-IC-T Working Group: Reference NOTES 3/2/64 KUERS (copy attached). Regarding your question to me as to the necessity of ring baffles in the S-IC-T vehicle, after discussion with Mr. Hellebrand, P&VE Lab, we have come to the following conclusion. Although the sloshing problem does not exist in S-IC-T, we feel that it is imperative that the structural integrity of the slosh baffle be investigated under the flow conditions which occur during filling and emptying. You recall that during the early Jupiter tests, the slosh baffles were distorted during the filling operation, and modification of these baffles was required for the flight vehicle. If the S-IC-T vehicle was being delayed only due to the fabrication of the ring baffles, we would say that they could be deleted. However, as you well know, there are a host of items which very well may cause a much greater delay than will the ring baffles.

4. MTF Working Group: The proposed MSFC contract with Air Products and Chemicals, Incorporated (APCI) for the liquid hydrogen plant for MTF was approved by NASA Headquarters on 3/11.

ATTACHMENT 1: NOTES 3/9/64 HEIMBURG (copy to Dr. von Braun only).
ATTACHMENT 2: NOTES 3/2/64 KUERS (copy to Dr. von Braun only).

attachment 2

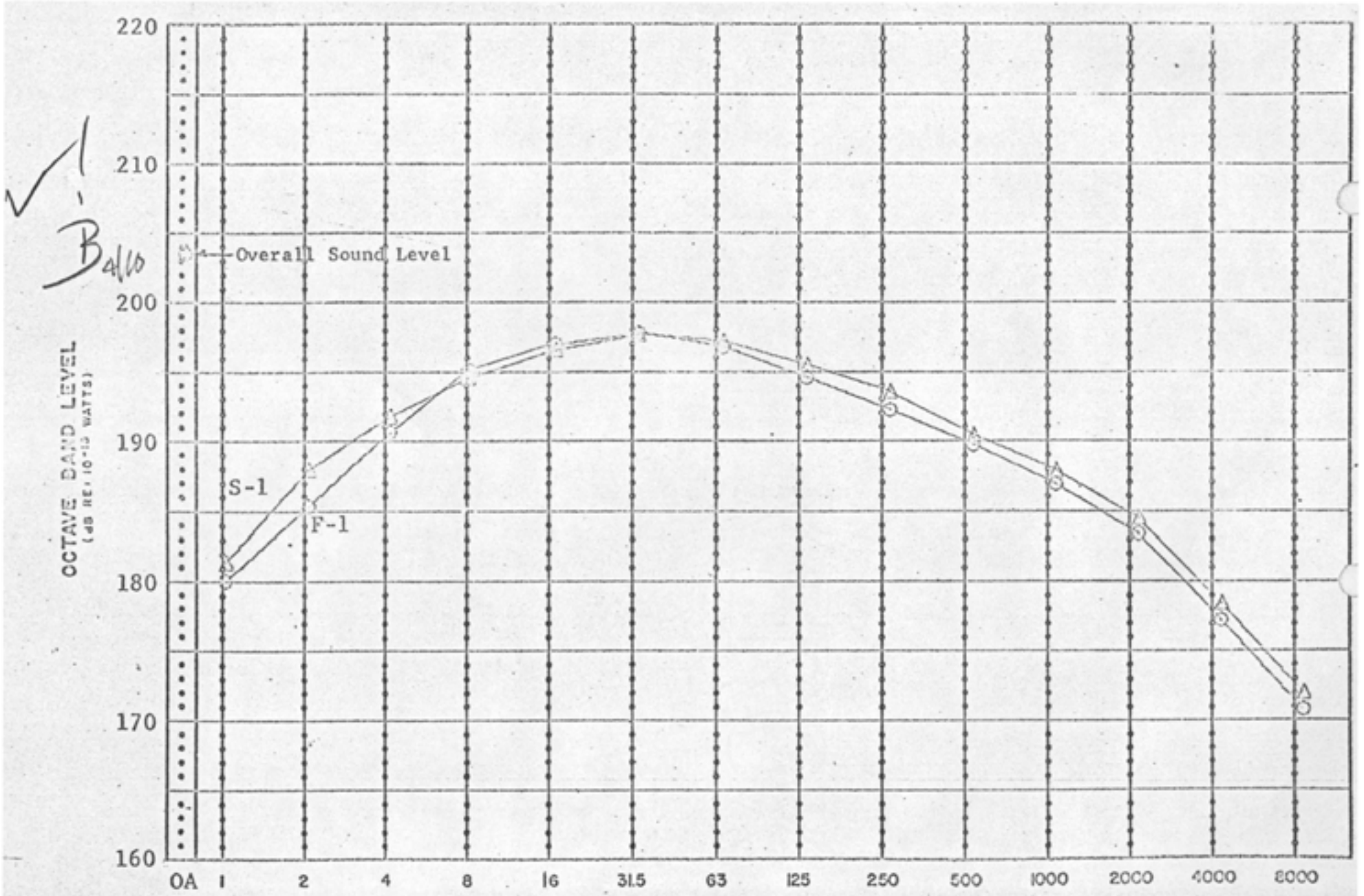
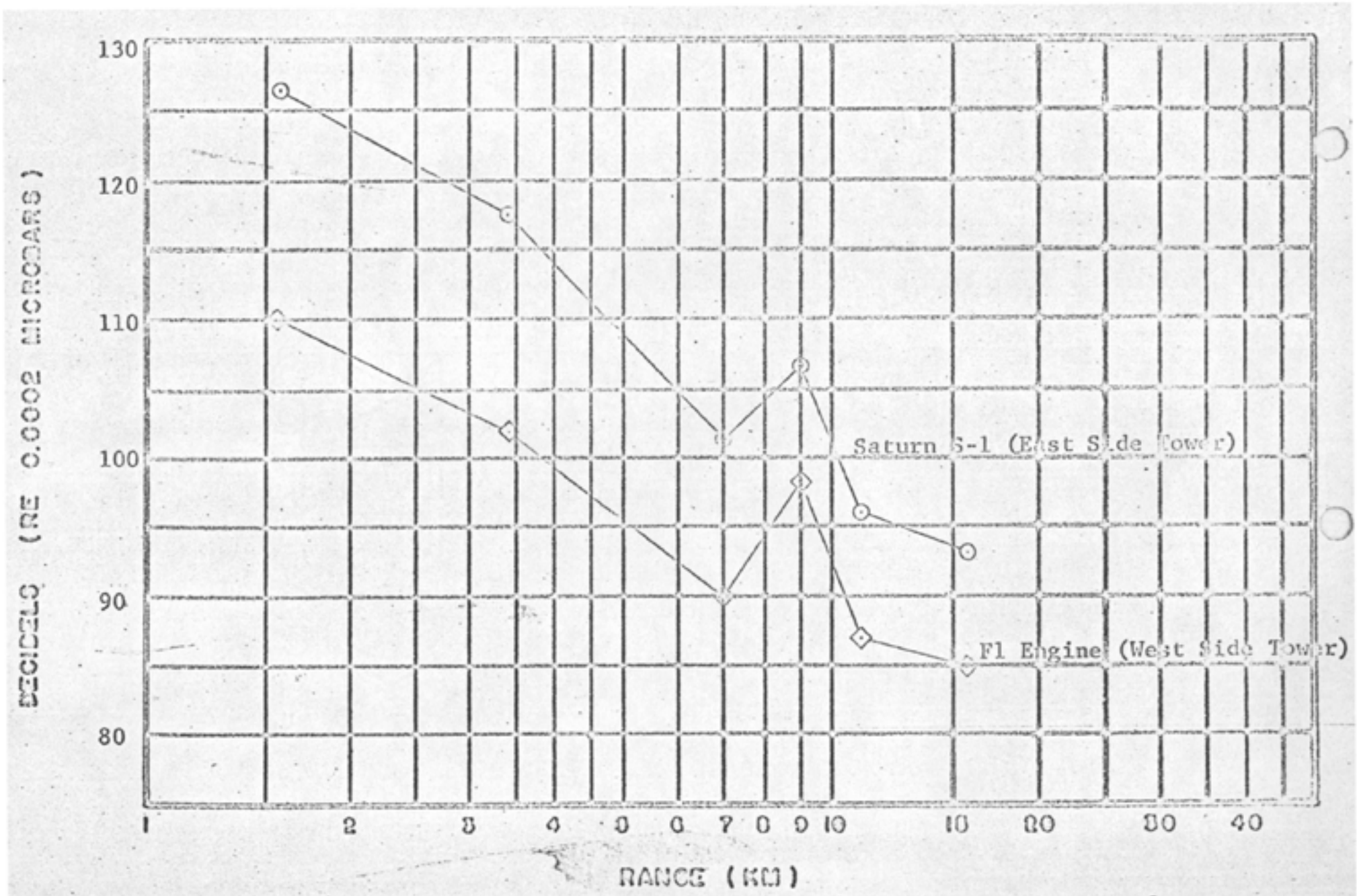


Figure 1

Power Level Spectra From Saturn S-1 and F-1 Engine Tests, March 24, 1964



Variation of Overall Sound Pressure Levels as a Function of Range Out 45° Azimuth
March 24, 1964
Figure 2

B 4/10

NOTES 4-6-64 HOELZER

1. COMPUTER FOR LOC: Computation Laboratory is still involved with LOC in setting up a relatively large scale computer facility to go into the Central Instrumentation Facility. This work is being done under the agreement between you and Dr. Debus. The evaluation and procurement will be done by MSFC. LOC has transferred sufficient money to MSFC for this action. This cooperative effort is very satisfactory and is still mutually beneficial to both LOC and MSFC. ✓✓

2. NATIONAL DATA PROCESSING MANAGEMENT ASSOCIATION MEETING IN NEW ORLEANS: This conference, of major importance in the data processing field, will be held in New Orleans on June 23-25. The Theme for the conference is "The Space Age Challenge" and NASA has been given the central display booth to be called the "Theme Area." The conference planning committee would also like tours of the Michoud Plant for several of the visiting management people. We will discuss this with Mr. Slattery. ✓

HH
Sure! Welcome!
B

Lee — Is this enough? Or could the Labs have furnished more? B

B 4/10

NOTES 4-6-64 JAMES

CCSD Mission Effort - All of the P&VE systems engineering effort defined as mission and furnished to this office has been incorporated into the Chrysler contract.

SATURN I - SA-6 - The spacecraft and LES have been erected and checkout of the vehicle is proceeding satisfactorily.

S-IV Contract Negotiations - The fee portion of the S-IV contract realignment negotiations with DAC have broken off. No date has been set for reconvening.

So, no fee? Best deal we could get! B

SATURN IB - Automation Status of the S-IB Stage - I have been concerned about the automation status of the S-IB Stage. Discussions with Mr. Fichtner have revealed that the automation desired for the stage has been incorporated with the exception of the CALIPS. These are under consideration. Mr. Fichtner's ground support equipment has been designed to accept all devices on board and with the CALIPS or the existing switches. Therefore, the hardware status of the bird is complete. We also discussed the ATOLL situation. He has in his hands today a letter from Chalmers Riley to us which will, hopefully, give us something with which to go to Chrysler for a cost proposal. If Chrysler is too high with their money, the program tapes will be furnished as GFE.

S-IVB Procurement Plan - The S-IVB Procurement Plan for the follow-on stages (SA-205 - 212) was handcarried to NASA Headquarters on April 2. MSFC requires authority to incur anticipatory costs no later than April 15 to maintain the schedule for these stages. This authority has been requested.

Dr. Feissler for your info B

Visit of Dr. Golovin - During the Saturn I/IB Presentation to Dr. Golovin last Wednesday on Saturn IB performance, Dr. Golovin stated that the State Department is strongly behind the orbital debris requirement and indicated that we may have to include controlled re-entry of the S-IVB Stage. It was explained to Dr. Golovin that the performance of the IB vehicle was extremely tight at this time and to incorporate this controlled re-entry would cause a 1000 - 2000 lbs. payload loss. He requested a copy of the Lockheed Space Debris Study.

ESE Design Mission - General Electric - MSFC presented the draft of ESE design mission to MSF on April 1, 1964. The draft was generally acceptable, however, additional requirements were imposed by MSF as follows:

(1) Define the tasks, per cent completion and whether they will be turned over to GE as Part I or Part II category.

(2) Milestones must be established for each task:

(a) Beginning and completion of Part I.

(b) Beginning and completion of Part II.

MSFC is now preparing an RFQ to GE which will include the changes. These changes will necessitate another review by Headquarters before the RFQ to GE. The addition of the changes and second MSF review will delay our schedule of events concerning the GE contract approximately 15 days.

Frank Williams — This has some bearing on the question we discussed getting about 300 FE people (plus possibly some MSFC people) out to the Parkersburg facility? Presto and prompto B

Suggest you discuss issue with James and Fichtner

B 4/10

NOTES 4-6-64 Koelle

1. PRESIDENT JOHNSON'S REQUEST: In a letter to Mr. Webb, dated January 30, 1964, the President requested a NASA position on the following two subjects:

a. A statement of possible future space objectives.

b. Estimates of time, funds, and technology required to implement major missions related to future objectives.

In a memorandum, dated March 25, 1964, Mr. Webb issued a directive to Dr. Seamans on how this request should be implemented.

A task group was established under Mr. Francis B. Smith (on loan from Langley) with two panels:

a. An Objectives Panel (headed by Dr. Richard Head)

b. A mission panel under Mr. W. Fleming. This panel has a subpanel for launch vehicles under Milton Rosen.

HHK Absolutely! B

I have been listed as the MSFC member on this subpanel and was alerted that this will result in a major workload, primarily for the people in my office. Mr. Webb has directed that this should be considered a top priority assignment. I am now standing by for further instructions and will keep you informed through these NOTES.

A preliminary response to the President's letter has to be ready by May 1. The special study is expected to last through July.

HHK I think our effort in this field should be closely coordinated with a) what MSC is doing in the field of large (Sat V type) orbital stations (see recent Aviation Week report on Douglas study for MSC) b) what we are helping to place in the nuclear propulsion field (Will Jordan is our permanent representative with Betty). Fingers in this field B

2. ORBITAL OPERATIONS: We had a first class final presentation last week by LTV on "Advanced Orbital Launch Operations." We are beginning to get our teeth into this very complex problem. Our next step in this area will be an attempt to lay out an experimental orbital operations flight test program, which envisions orbital assembly and fueling tests of S-IVB's and S-II's in the early 1970's. This will be a sizable program involving 10 to 20 SATURN V's and IB's. We have the support of Ed Gray and Mike Yarymovych to enter this phase in the next twelve months. Most of this effort will be done in the form of contractor studies.

3. SATURN IB MARKETING POLICY: We had our first discussion on the above subject with Lee James and his staff. We will attempt to find a middle ground which can be agreed upon by projects and "marketing" people, so that we will have a competitive product to offer for the Post-APOLLO time period. For the IB, this time period begins with CY 1967 and with FY 1966. Thus we have no time to loose. We hope to send you the draft of a marketing policy in about two months.

Agree B

B 4/10

NOTES 4-6-64 KUERS

1. Saturn V, S-IC Stage: Thanks to Mr. Heimburg's efforts and his repeated meetings with Messrs. Stoner, Nelson, and Wilkinson, the flow of documentation is improving substantially. A few figures are indicative for the present rate of documentation flow:

Total Number of Drwgs Received for -T by February 1, 1964	Approx. 1425
Additional Dwgs. for -T Received During February	1452
Additional Dwgs. for -T Received During March	684
Total No. of EO's Received for S-IC, All Vehicles by Mar. 1	8003
Additional EO's Received Since Mar. 1	3183
Total Number of EO's	11,186

The flow of EO's was a little more than 125 per working day. Ninety percent of these change orders are of the 5002 class, which are defined as design changes affecting only a single drawing; such as, dimensional changes, correction of errors, tolerance changes, etc. Since we have not based our planning and schedules on such a high rate of changes, I can only predict that our schedules will slide. Every single EO requires an action on hardware or on paperwork. The accummulative effect of these actions on modifications for material requirements, tooling, manufacturing, and delivery of components are difficult to predict.

Arthur Rudolph

FYI

B

2. In addition to this not very rosy picture of the status of documentation for -T, I have pessimistic views on the status of development and delivery of the miscellaneous hardware, mechanical and electrical. We have now good charts from Boeing depicting the delivery dates of the many line items involved. But these charts are based on delivery promises from sub-vendors of Boeing. I cannot judge how realistic these forecasts are.

3. Progress of In-House Assembly for -T: The meridian welds for the last bulkhead for -T have been completed. Two cylindrical sections for the lox container have been welded. Joining of the two container halves of the fuel container has not been accomplished because of a breakdown of the welding equipment. The thrust structure is making good progress on full two shifts. The skin panels for the inter-tank section have been delivered by Boeing and are being assembled in Bldg. 4705.

NOTES 4-6-64 MAUS B 4/10

1. MANNED SPACE VEHICLE COST STUDY - Discrepancies in some of the cost estimates developed in this study have caused a delay in submission of study results to MSF. We have advised headquarters and we are working with project offices to clarify. We will be prepared to brief you on the results after your return from the Thomas Subcommittee hearings. ✓ Just took it in. Good work! B

2. MIT ORGANIZATION RESEARCH PROGRAM - In my NOTES 3-23-64 I reported on visit by MIT Prof. William M. Evan, in connection with NASA Grant #NSG235-62 (research in problems of organizing and managing large-scale technology-based enterprises). After review of his proposal, we concluded that probable benefits to NASA and MSFC would not justify the time and effort required. (Some 105-140 people would be required to fill out questionnaires; also, we have only a limited number of groups who perform the type of R&D that Dr. Evan is looking for.) We are preparing courteous declination for Mr. Gorman's signature. ✓ !!!

3. FY 64 FISCAL SITUATION - MSFC actual obligations are again falling short of planned obligations.

MSFC FY 64 R&D Cumulative Total Obligations
(MSF Programs, I, IB, V, Engines, SRT, & Adv. Studies)

	End. February	End March
Feb. 7 POP Estimate:	863.0	919.9
Mar. 24 Estimate for Mgmt. Council:	782.2	879.6
Actuals per Mar. Flash Submission to Hdqs:	784.1	856.9

This performance is regrettable since estimates were made quite recently and were requested to be low to avoid this pitfall.

In this light, we will carefully review new obligation predictions due in conjunction with April 15 POP submission. ✓

B 4/10

NOTES 4-6-64 McCartney

1. PERSONNEL ACTIONS: On April 1, I met with R&D Operations Resource Management Chiefs to discuss implementation of a MSFC desire to reduce the number of personnel actions for the rest of this year. To relieve the heavy backlog of actions in the Personnel Office, each laboratory and office is reevaluating its outstanding personnel action requests. Priorities for R&D Operations promotions can now be established, since the Personnel Office has responded to my April 1 request to furnish R&D elements with a list of approved actions, a list of favorable actions Personnel does not have time to do, and a list of return actions Personnel just will not agree with. The R&D Operations laboratories and offices will submit their new priority lists to R-DIR on April 6 for review and approval, prior to Personnel Office action. ✓

2. SRT AND ADVANCED STUDIES PROGRAMS: On April 1 and 2, representatives of my Programs and Contracts Group attended meetings with MSF personnel and other interested Marshall elements to review the obligation status of MSF FY-64 Supporting Research and Technology and Advanced Studies programs. Mr. Scrivener, MSF, stated that these programs might be cut if there were no firm obligation plan. He was assured by the program managers, FMO, and Purchasing Office that Marshall will have the funds obligated by June 30. Nevertheless, the workload remains extremely heavy. Purchasing Office has indicated that they can obligate all funds if their schedule for receipt of Procurement Requests is met. Members of my office are in daily contact with appropriate R&D Operations elements to assist them in this work and to assure compatibility of the packages going forward to FMO and Purchasing. ✓

McC
This is of utmost importance
B

3. FACILITIES UTILIZATION PLANNING: Members of my Facilities and Materials Group are working with the laboratories and offices in facility utilization planning. To provide a basis for the overall effort, data are being compiled on present facility use. As a first cut, we have defined current use of R&D Operations buildings, correlating usage with manpower and floor space. Concurrently, the laboratories are developing plans for the future use of R&D Operations facilities. My office provides a central coordination point for that planning; the data being collected will back up the FY-66 CofF program. ✓

4. P&VE ION ACCELERATOR FACILITY: (Reference attached 3-30-64 Notes.) The ion accelerator equipment, originally ordered for the RIFT Project, will be used by Dr. Lucas for a variety of radiation studies. The $40,000, certified from FY-64 Administrative Operations funds, provides a small addition to Building 4623. The facility will house the accelerator, which will be shipped from the manufacturer on facility completion.

McC
such as?
B

NOTES 3-30-64 McCartney B 3/31

1. FY-66 CONSTRUCTION OF FACILITIES BUDGET: All project writeups for the consolidated R&D Operations FY-66 CofF Budget Proposal have been completed and delivered to the Facilities and Design Office. ✓

2. REPAIR AND ALTERATIONS PROJECTS: Financial Management Office has certified $40,000 Administrative Operations Funds for P&VE's Ion Accelerator Facility. Fund allocation is still pending for the $2M of Repair and Alterations projects, which were previously R&D funded until the recent NASA Headquarters ruling that Administrative Operations Funds must be used for Repair and Alterations. ✓

3. MANPOWER CONTROL: Last week, we met with six laboratories and offices to aid in categorizing contractor support for manpower control plans. The laboratories and offices are moving out strongly in developing these plans. Problems taken up during these meetings included conversion to one overall support contractor per laboratory, segregation of contractors, and provision of appropriate facilities. We plan additional meetings during April. On March 27, a representative of my Operations Engineering Group furnished guidance on manpower support categorization during the meeting on the GE Apollo contract amendment for Saturn IB/V electrical support equipment. ✓

4. STATUS OF SATURN "BLOCKED ACCOUNTS": As of March 26, unencumbered funds placed in blocked accounts for Saturn I remain about $8M and for Saturn IB about $6M. During the last two weeks, Saturn V "blocked" funds have been reduced from about $11-1/4M to $7.7M. ✓

NOTES 4/6/64 RUDOLPH

B 4/10

1. Bermuda - AZUSA - In the last Management Council Meeting I got an action item from Dr. Mueller on "Bermuda - AZUSA." From all indications Dr. Mueller thinks this station is not needed. I will meet on Tuesday afternoon, 7 April, with Dr. Speer, ~~Mr. John Franklin of STL~~, Dr. Rees, and Dr. Hueter. Mr. Young has asked STL to serve as a consultant in this issue. ✓ I guess our case is honest but not too strong B

2. S-IC Stage:

Quarterly Review is tentatively scheduled for April 23 and 24, 1964, at Michoud. Agenda for both days are being coordinated and will be released during the week of April 6, 1964. ✓

Overhead Rates - On April 6, 1964, Boeing will present to representatives of NASA and the Air Force their position relative to the continual increase of overhead allocations from Seattle. The presentation will be held at Michoud Operations. ✓

3. S-II Stage Checkout - Direction is being finalized for release to NAA/S&ID for the elimination of low bay pre-mate stage checkout in the vertical assembly building at KSC. ✓

Frank Williams FYI (GE location in HSV area, partway facility etc) TB

4. Electrical Support Equipment (ESE) - The G.E. mission statement for Saturn V Vehicle ESE design was discussed with OMSF on April 1, 1964. It was suggested that MSFC present a finished RFQ and supporting documentation by April 27, 1964, (date not firm). MSF personnel felt that a better package submitted at a later date would be better than a lesser package submitted on our original target date of April 15, 1964. It was also suggested that if necessary to meet contract schedule requirements Task #3 could be extended beyond June 30, 1964.

5. IBM, Prime Contractor - The second draft of the work statement for the new prime contractor effort with IBM has been coordinated with each Laboratory. An RFQ is expected to be issued to IBM on May 1, 1964. ✓

NOTES-4-6-64-SHEPHERD B 4/10

General Hayes, Bob Long and Col. Wilhoyt Visit: As an orientation for Col. Wilhoyt, General Hayes' replacement, the above group accompanied by a number of others toured Cape Kennedy, Houston, Michoud, MTF and Huntsville this past week. The following is of interest:

Bob Long - (a) Mr. Long desires to establish a West Coast construction estimating capability for NASA wide use. This organization or contractor would provide a central group to perform construction estimates on all construction change-orders made by MSFC, JPL, Houston, etc. We voiced our objections to this and will oppose if Long pursues this further.

(b) Long showed me a copy of a letter he had written to Dr. Seamans in regard to the abolishment of his present office and to the establishment of a Construction Office having the same types of authority for facilities as now invested in the Procurements Office in Washington. In this organization he would centralize all facilities functions at the Washington level. He apparently has an idea to pull the facilities functions from Dr. Mueller. I am confident that Mueller, Lilly and Phillips would object violently to this loss of control of a vital portion of their program. ← Apply the needle, but judiciously B

Shep I've shown this → par. to Dr. Mueller. His reaction: "Ah, another empire builder." Suggest you follow up B

Generals Hayes/Wilhoyt: It was obvious that Gen. Hayes is still attempting to obtain more NASA construction work, including procurement of certain technical systems which are normally handled by the Center. Gen. Hayes does not realize that under NASA the Corps is managing a much larger amount of our work than would be the case under Air Force policy. For example, under the Air Force the test stand superstructure are classified as Special Test Equipment and are usually provided by the stage contractor. The Corps is presently administering about 52% of the Marshall construction dollar. We are asking the Corps to prepare a long-range manning plan for their MTF Area Engineer Office. It should be to our advantage to establish the fact that we do not expect the Area Engineer Office to become a permanent charge to Marshall in the MTF area, at least not at the present level of effort. At the present time the Corps plans to peak at about 185 people. Our projections show that approximately 77% of the construction effort will be completed by December 1965. This is based on 200.0 million of a total program of $260.0 million actually being paid to construction contractors for work in place.

NOTES 4-6-64 Stuhlinger

B 4/10

1. SRT PROGRAM STATUS: The status of the portion of the SRT program managed by RPL as of April 3, 1964, is as follows:

	ANNUAL PLAN	AUTHORIZED	PROCESSED TO FMO	OBLIGATED
OART	10,249,000	10,249,000	8,258,400	1,872,300
OMSF	14,163,000	14,133,000	11,893,897	360,184
OSSA	675,000	675,000	637,075	17,265
Total	25,087,000	25,057,000	20,789,372	2,249,749

2. RPL SPONSORED ART-SRT FY-65 PROGRAM STATUS: We have received 586 tasks from the labs and offices of MSFC totaling $66,782,000 for inclusion in our FY-65 ART-SRT programs. Our guidelines from Headquarters total $24,175,000. We are now reviewing, reducing, and consolidating this program.

3. MSF-SRT FY-64 OBLIGATIONS AND FY-65 PROGRAM DEVELOPMENT: Messrs. Scrivener and Lovejoy of OMSF visited MSFC this week to discuss FY-64 SRT commitments and obligations, and the FY-65 Launch Vehicle Technology and Propulsion Technology Programs. They were also prepared to grant us fifth quarter obligation authority, but P&C, Executive Staff, and Resources Management Office stated that we would not need the fifth quarter.

E.S. Those optimists B

4. WITHDRAWAL OF 1.9M ART FUNDS BY OART FOR MMC: We learned that OART is withdrawing $1.9M from our ART program to support the MMC project. Members of RPL met with Mr. Weidner and Mr. Bush of R-RM on the afternoon of April 2, to discuss this problem. It was the feeling of Mr. Bush that he could reprogram Saturn money to cover the MMC requirement and leave the 1.9M ART money as is. The situation is now being investigated by IO, Executive Staff, and R&DO. E.S. → Seems to be the only way out, if we want to avoid getting Congress involved in the MMC overrun. Maus can brief you B

5. VISITORS FROM MSF DIRECTORATE OF FIELD CENTER DEVELOPMENT (CAPTAIN FREITAG'S OFFICE): The functions of Captain Freitag's Office, the way in which it can benefit our research program planning, and the ways in which we can assist that office were discussed with Messrs. Brazill and Ferris during their visit here on April 2. Two potential problem areas were discussed because of their interest in future development of the Center. These were - (1) allocation of manpower at MSFC to work on OART sponsored tasks is expected to be put to a critical review by MSF in FY-65 planning, (2) difficulty in funding a task that has developed beyond OART sponsorship, but has not yet advanced far enough to interest MSF.

April 13, 1964

Brennan

NOTES TO MUELLER 4-14-64 DEBUS

1. EXPLOSION in SPACECRAFT SPIN TEST FACILITY: Details (as of 16 Apr) have been furnished to your office (Redfield) as they become available. Twelve men were injured: 3 in critical condition (two not expected to live), 4 others in serious condition. Ball Brothers, Douglas, and NASA personnel were involved. Operation of the facility and tests are under Bob Gray, GSFC; he has been keeping Goett and Newell's offices advised. AFMTC is responsible for ground safety (entire Cape area) per Webb-McNamara Agreement. AFMTC has appointed Accident Investigating Board with NASA representatives. Newell has appointed a technical fact-finding committee to investigate rocket motor (X248) and ignition system.

2. UNIFIED S-BAND: At the request of Buckley (OTDA), a study is being made to determine whether 10,000 sq. ft. of the CIF can be made available to GSFC for a unified S-band station, with a 30 ft. dish nearby. This is a problem area that I wish to bring to you separately and will do as soon as possible.

3. MODIFICATIONS TO COMPLEX 34 SERVICE STRUCTURE: Based on a recently completed structural analysis of the Complex 34 service structure, it has been determined that we currently have only a 95 mph wind capability (measured at the 30ft. level) before exceeding design working stress of certain members. Since design of the Saturn I Block II modifications to this structure are presently underway for Saturn I backup capability, it became necessary to decide whether to continue the design with the 95 mph capability or include the necessary structural modifications to increase the capability to 125 mph. Since we can have a capability to activate 34 for Saturn I with the 95 mph capability within the three months committed to you (versus a 7 month design and activation time after SA-6 for the 125 mph capability) we are going to continue the Saturn I design with the 95 mph capability. The Saturn IB modifications will include increasing the capability to 125 mph in the configuration for the Saturn IB. KSC will investigate various emergency means at our disposal to protect the structure during the 1964 hurricane season.

4. PHASE-OVER FROM PAA TO TWA: This action went off exceptionally smooth in both the maintenance and utilities areas of operation. Problems of shortage of working space and office space are being worked on.

5. CONTRACT ADMINISTRATION AND COR TRAINING COURSE: Preliminary discussions with Harbridge House were held on March 27. Action is in progress to negotiate a contract which will provide training to approximately 120 KSC personnel associated with our support services contracts, such as base operations, launch support services, etc. The course will probably run a month at a time and be composed of 4 or 5 classes running concurrently on different subjects. It will start about June 1. Meanwhile Harbridge House will use April and May for research and course preparations.

6. PLANT LAYOUT - STATUS OF NEW MOVES:

a. Central Supply move was completed March 25.

b. MILA Fire Station completed over March 27-30 weekend.

c. MILA Dispensary completed and made operable at 0800, March 30.

7. KSC 85 FT. DISH: Baechtold of Lilly's office asked for assurance that KSC can receive TV from the LEM at the moon. If so, the data should be received here and relayed to Houston over planned lines, saving the cost of new lines from Goldstone to Houston. He assured us that, if we can receive it as well as Goldstone's 85 ft. dish, we will have unlimited backing from Headquarters for an 85 ft. dish. We can definitely state that, with equipment planned, our data will be at least as good.

8. CONSOLIDATION OF PASSENGER TRAVEL FUNCTIONS: KSC assumed responsibility for MSC passenger travel functions on April 13, 1964, on a trial basis. Two MSC travel clerks will be detailed to KSC for 6 months to effect an orderly transfer. Permanent assumption of this responsibility will be dependent upon the development of personnel spaces within house or by transfer from MSC.

9. ERECTION OF STRUCTURAL STEEL, VAB: Very little work accomplished this week due to various labor problems.

10. LABOR SITUATION: Security guard pickets and the ironworkers walkout continued to stop NASA construction on Friday, April 3, 1964. A temporary injunction on April 4 solved the security guard situation; however, the ironworker walkout continued to delay critical Complex

39 and Industrial Area work through Wednesday, April 8, 1964. The majority of NASA work was back to normal April 9, and ironworker negotiations for a contract with the contractors' association are continuing on a Washington level.

11. WACHENHUT - UNITED PLANT GUARD WORKERS OF AMERICA (UPGWA): U. S. District Court, Orlando, issued a Temporary Restraining Order on April 4 prohibiting UPGWA from picketing until noon, April 9, 1964. A Hearing is scheduled for this date at 4:00 pm to determine if the Temporary Restraining Order should become a temporary injunction until National Labor Relations Board charges of unfair labor practices have been decided.

12. UNION PICKETS AT MILA: Union pickets left MILA premises at 3:00 pm on April 4, 1964, after court order which was issued from Orlando at 11:00 am the same date. On April 6, 1964, Wackenhut Corporation, supervised by NLRB, held an election of Wackenhut employees to determine if they wanted to join the union. The vote was 35 to 7 against the union.

13. IRONWORKERS AGREEMENT: Local negotiations are being referred to the President's Missile Sites Labor Commission. Parties have appeared before the Commission on April 9. Ironworkers have agreed to return to work while negotiations are before Commission. Latest report is that ironworkers are slowly returning to their jobs.

14. METEOROLOGICAL ACTIVITIES:

a. A test of the Magnetic Links at Launch Complexes 34 and 37 indicated that no lightning strike had occurred on either complex during the past stormy weekend (28-29 March).

b. LC 37 Lightning Warning System has been installed. During the SA-6 launch it will be possible to monitor potential lightning hazard within a 3-mile radius from inside the blockhouse.

15. SATURN V HOLDDOWN ARMS FOR LC 39: Representatives of KSC visited Space Corporation, Dallas, Texas, on April 2, 1964, to observe general progress and to clarify minor revisions of the drawings of the Saturn V Holddown Arms for the Launcher/Umbilical Towers of LC 39. Work is proceeding satisfactorily and is on schedule. A milestone of this work will be the pouring of the first pre-production main casting, scheduled for about May 15, 1964.

16. CABLE TERMINAL BUILDING, COMMUNICATIONS DUCTS AND MANHOLES, NASA MERRITT ISLAND LAUNCH AREA: Bids opened March 26, 1964.

Apparent low bidder:	Akwa Construction and Downey Heating Company (JV)	$1,997,799
Seven other bids ranging up to:		2,696,370
Government estimate:		2,619,850

17. OFFICE SPACE: The buildup of contractor support is causing acute shortage of office space. Maximum density layouts have been prepared for temporary partial usage of the Plant Maintenance Building for office space by BOD and TWA. It may be necessary to construct some temporary type office and support space in conjunction with permanent buildings to house related functions, such as the Maintenance operations.

18. GAO: GAO to commence VAB audit. On April 8, the GAO Atlanta Regional Manager notified us that on April 28 they plan a two-man review of the VAB Project, "including a review of the justification for that facility." As far as we know, this is a routine audit which we will handle the same as their inquiry of Complexes 34 and 37. On the justification question, we plan only to give them the documentation of the budget history which led to Congressional authorization of the project.

NOTES 4-13-64 CLINE

1. S-IV-6: The cold helium supply valve (Calmec) leaks and will be replaced. The replacement valve was scheduled to arrive at the Cape on 4-10-64. The valve failure could cause a schedule slippage. This is the valve which was primarily responsible for the All-Systems Vehicle Explosion.

2. LUNAR EXCURSION MODULE (LEM)/INSTRUMENT UNIT (IU) WORK PLATFORMS: (Reference NOTES 3-20-64 CLINE, paragraph 3.) Action item 20 from the seventh Saturn/Apollo Mechanical Integration Panel Meeting was poorly worded. The platforms referred to are the human access or work platforms for servicing the LEM and IU while in the vertical assembled position.

3. S-IC STAGE F-1 ENGINE FLAMEUP: (Reference NOTES 3-30-64 CLINE, paragraph 4.) The "flameup" characteristic of the F-1 engine is a condition resulting from fuel-rich gases being exhausted from the turbine into the thrust chamber, mixed with LOX, and subsequently ignited by the nozzle squibs during the primary phase of ignition and at engine cutoff. Upon leaving the thrust chamber at a relatively low velocity, burning gases produce a flame which "mushrooms" and engulfs much of the engine. When "mainstage" is reached, all flames are directed downward and "flameup" ceases. This condition is not detrimental to engine hardware. Test Laboratory has taken corrective action on the F-1 stand with three ring manifolds being mounted on the upper portion of the engine and tower. Prior to engine start, a gaseous nitrogen (GN_2) purge is introduced through these manifolds to direct all flames downward. Since the "flameup" characteristic is also experienced at engine cutoff, this purge is continued through engine shutdown. The resultant effects of "flameup" on stage components is still under investigation. This investigation is scheduled for completion 5-4-64.

4. S-IC INTERTANK: Information requested is being forwarded under separate cover.

5. POGO PROBLEMS: We are establishing an Ad Hoc Task Force to define all problems incident to the "Pogo" phenomenon. This Task Force will recommend specific actions to be taken (tests, analyses, etc.). We will include one representative of each concerned laboratory and prime contractor as required. This Task Force will report to Mr. E. Hellebrand. (NOTE: There is a meeting of the Vehicle Mechanical Design Integration Working Group on 4-15-64 on this subject. All concerned contractors will be in attendance.)

Attachment #1: NOTES 3-20-64 CLINE
Attachment #2: NOTES 3-30-64 CLINE

NOTES 4/13/64 CONSTAN B 4/20

1. VISIT OF CONGRESSMEN MILLER (CALIFORNIA) AND MORRISON (LOUISIANA)

On April 6, 1964, Congressman Miller, Chairman of The House Space Committee on Science and Astronautics and Congressman Morrison, visited the Michoud Plant for a general orientation and briefing. Messrs. Eberhart Rees, MSFC Deputy Director, Technical; Jack Brown, Office of Legislative Affairs, NASA Headquarters; and Charles Ducander, Staff Member of The House Space Committee, accompanied the congressmen.

2. S-IC Tank Skin Panel

Five LOX Tank Skin Panels are found to have small cracks at the root of the integral "T" stiffners at the edge of the panels. Initial investigations indicate that these cracks are due to vibration caused by the router tool used for final edge trim. Firmer restraint of the "T" section during final trim seems to have eliminated the problem on the last three skins, altho it has not been definitely established that vibration was the only cause.

3. S-IC Inter Tank Re-design

On eighth scale model test and one full scale test on a single skin panel show that the present design of the inter tank is inadequate. A Change Action Memo (CAM) is being prepared by Boeing for presentation to MSFC, calling for ring frame "beefup" and bonding strips to the skin. A weight increase in the order of 1000 lbs. or more is anticipated. This fix does not impact S-IC-T schedule.

NOTES 4-13-64 BELEW

RL10 ENGINE PROGRAM

Negotiations for definitization of the contract on the follow-on R&D effort (currently under letter contract) have been completed. The contract is being hand-carried to Headquarters for approval during the week of April 13.

We have fed the details of the uprating in engine Isp for Centaur into the Saturn IB Third Stage Studies. Both modified and current engine will be considered.

H-1 ENGINE PROGRAM

The first set of redesigned 200K components has successfully completed 2500 seconds of testing on Engine H-118C. This engine assembly included the Coast Metal 62 thrust chamber which completed the test series with no leakage.

A Review is scheduled for April 14-15 at Canoga Park, California.

F-1 ENGINE PROGRAM

A technical review of a major redesign to the F-1 turbine area was held last week between Rocketdyne and MSFC personnel. Conclusions drawn so far are that, although the new 30-in. turbine design shows potentially good improvements as regards to reliability, the earliest introduction of this design into deliverable hardware would have to be made in less than 12 months from now and at a time when very little R&D experience with the new design would be available (less than 100 tests). In addition, a net weight increase of 400 lbs. per engine would have to be wrestled with. (Predicted increase in engine performance due to the new turbine of 0.3 sec. if attained would balance the weight gain.) Based on the very late availability of this new design in production, the R&D program effort will be continued as a product improvement item and/or hardware feasibility demonstration. The major effort will remain on modification and qualification of the present 36-in. turbine design.

J-2 ENGINE PROGRAM

The first J-2 engine, 2003, scheduled for the S-IVB battleship program, completed the hot-firing acceptance tests on April 7. Presently this engine is undergoing post-test electrical and mechanical checkout and should be shipped to Douglas Aircraft Co. on April 21. Rocketdyne's proposed 14 to 1 thrust chamber program was received today.

In-house meetings on Rocketdyne's proposal for the definitization of letter contract NAS8-5603 (production engines) were completed on April 10. Negotiations with Rocketdyne are being initiated today, April 13.

M-1 ENGINE PROGRAM

The definitized R&D facilities contract was signed March 24. The contract signed was the negotiated contract of Feb. 28, 1963, for $227 M (R&D $178 M and facilities $49 M). The FY'63 funding was $35 M R&D and $13 M facilities with the FY'64 funding being reduced to $24 M R&D and $10 M facilities. It is anticipated that the FY'64 funds will be $25 M R&D and $4 M facilities. It is also anticipated that the future R&D funds will amount to $25 M per year. Based on these funding problems, LeRC slipped the PFRT date 36 months (May 1971), and deleted some tasks primarily in the vehicle interface areas, until funds become available. Negotiations to amend the contract to reflect the changes are scheduled for the week of April 20, at LeRC.

Fw 4/13

B 4420

NOTES 4-13-64 DANNENBERG

1. Gemini GT-1 shot was attended by Kuettner in Cape Mission Control Center. Liftoff was 1 second off. Injection velocity 30 fps high, injection angle slightly negative, apogee 10 miles high. Pogo oscillations reduced to ± 0.4g at 13 cps. Three pieces were tracked, one big, two small. Small ones reentered after a few orbits (unexplained). Excellent voice communication around world. ✓

2. Gemini - Saturn IB Three stager. MSC Gemini Project Office is working on 3-stage proposal for Gemini circumlunar flight using IB Centaur (unofficial). Mathews expressed desire to come to MSFC for preliminary technical talk. Kuettner will attend proposal presentation to Hq (Gray) on Monday. ✓

3. Saturn IB weight reduction and performance recommendations by R&D are being documented and will be available this week for action by IO. ✓

4. MORL Project. Langley Research Center Liaison has suggested that MSFC consider using four Minute Man Boosters strapped on the SA-10 vehicle to demonstrate Saturn I growth capability to support an MORL development program. Too late! But I'm all for studying it in connection with the Saturn IB, And 160" boosters for Saturn V as well! Please take up with Fred Ume

K. D.

B

5. Saturn IB Brochure and Data Books. The Saturn IB brochure was received from Chrysler and final concurrence is being obtained from MSFC and NASA Headquarters. ✓

NOTES 4/13/64 HAEUSSERMANN B 4/20

1. SA-6 G&C SYSTEM TESTS: Preflight simulation tests of the combined guidance and control system were completed on schedule. R-ASTR-G&C Division tests gave the following average deviation from the R-AERO standard:

- Δ injection attitudes = -0.4 km
- Δ path angle = -0.03 degrees
- Δ cutoff velocity = 0 - 1 m/s
- Δt = -3 seconds

The cutoff of 3 seconds early was caused by inherent errors in calibrating analog equipment used to simulate the vehicle dynamics.

2. TEMPERATURE-VACUUM TESTS OF STABILIZED PLATFORM COOLING SYSTEM UNDER STUDY: Tests are being performed in conjunction with P&VE to determine the effectiveness of the water/methanol cooling system on the stabilized platform. The water/methanol is being used to remove heat from the platform covers, the electronics box cold plate, and the gas supply heat exchanger. Vacuums of 4.66×10^3 N/m^2 (3.5×10^{-5} torr) have been maintained for seven hours with all platform temperatures stabilizing at desired values. Parameters have been varied and the effects observed. No problems with the system are apparent at this time.

3. SA-5 SATELLITE: Satellite failed over Santiago, Chile at 1500 hours Z between pass 990 and 991, 4/3/64. The GSFC network and Green Mountain confirmed this by attempting track 4/4 and 4/5, without success. Orbital life of satellite was 67 days. Probable cause of failure was battery exhaustion. Last battery voltage reading was 22.7 volts. First sign of trouble was on pass 898, and after that, transmitter operations became erratic and failed on pass 990. All measurements worked properly during life of RF transmissions.

The design lifetime of the Minitrack system on the SA-5 payload was 50 days. However, a safety factor was inserted to assure the absolute lifetime of 50 days under the worst case such as extreme temperature fluctuations.

The battery pack was composed of nickel cadmium cells which operate best over the temperature range of -15°C to +60°C. Reduced ampere-hour ratings and possible premature failure could have occurred if these limits were exceeded within the payload. According to data received from the satellite, the limits were not exceeded to any great amount and the 50 day minimum was realized.

The cause of failure at the end of 67 days was probably due to two factors; one being that the batteries had become exhausted and the other being that the transmitter would stop oscillating below approximately 22.6 volts. TOTAL SATELLITE LIFE PREDICTION IS STILL 450 DAYS FROM LAUNCH.

Jw 4/13

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NOTES 4/13/64 FORTUNE

1. Presentation to Congressmen: On Monday, April 6, made presentation at Michoud to Congressmen Miller and Morrison. The weather was such that helicopter flight to MTO had to be cancelled. ✓

2. Visit to West Coast: On Tuesday and Wednesday, visited Aetron, Seal Beach and Santa Susanna to discuss progress made on S-II and Phase I of the Technical Systems. On Thursday, with Mr. Young and Myrl Sanders, made presentation on MTF Activation Plans to S&ID officials. During discussions, Mr. Young brought out that vertical check out facilities at Seal Beach and MTF should be similar. ✓ Meeting emphasized also that close coordination of Aetron and S&ID during activation of test stand will be necessary to avoid labor dispute and to meet schedules. ✓

3. Governor Johnson's Visit to MTO: Governor and Mrs. Johnson, Lt. Gov. and Mrs. Gartin and approximately 100 members of the Mississippi Legislature with their wives visited MTO for two hours last Friday. All of the visitors were impressed with the facility and expressed amazement at all the progress that has been made. ✓

B 4/20

NOTES 4/13/64 GEISSLER

1. SA-5 Tracking: GSFC has informed us that the SA-5 minitrack beacon is now dead. The actual beacon life was 63 days as compared to the nominal value of 50 days. GSFC will continue to establish SA-5 ephemeris on the basis of radar skin track and optical observations. Total satellite life prediction is still 450 days from launch.

2. Saturn IB Third Stage: On April 6, Mr. de Fries gave a briefing to Mr. Mueller on the various third stages for Saturn IB, covering basic performance, cost, development time, and major characteristics. The major effort was concentrated on the Centaur stage. Mr. Mueller asked that detailed information be prepared for the May 19 Management Council Meeting for a Saturn IB/Centaur Configuration. On April 8, a meeting was held by Messrs. de Fries, Dannenberg, McClard, Reinartz, Goerner, Digesu and Dr. Mrazek to discuss the MSFC approach to this effort; on April 10, a meeting was attended by representatives of the various Laboratories to establish the necessary study schedule and work assignments.

At the April 6 meeting, we were asked to help Mr. Ed Gray with some data on performance, costs, and development time for various third stages (particularly the fluorine/hydrogen stage). Mr. Mueller asked Mr. Gray to write a letter to Dr. Seamans containing such information in response to a presentation that was previously given to Dr. Seamans by Mr. Fleming on Saturn IB third stages. The data that Mr. Fleming showed was seriously questioned by OMSF and they wanted to make this known to Dr. Seamans. The two key points made by Fleming which were questioned were: the 48 month development time and $230 million cost for a hydrogen-fluorine upper stage. On April 10, the above mentioned information was given to them. Saturn IB three stage vehicle performance data which was relayed to them is as follows (gross payloads at escape via 100 N.M. parking orbit):

Start Mode	Agena D	Titan III Transtage	Service Module	Centaur	S-IV	Proposed LF_2-LH_2 Stage
Orbital	4,700	7,400	4,100	10,900	9,000	11,800
Suborbital	-	-	5,100	13,700	-	14,700

E.D. Gray's recent letter to Seamans seems to use these and additional figures B

NOTES 4-13-64 GRAU

1. S-I-7 POST-STATIC CHECKOUT: Post-Static checkout of the S-I-7 stage continues in Station B, building 4708. Instrumentation checkout is approximately 90 percent complete and on schedule.

2. S-IU-7 INSTRUMENT UNIT CHECKOUT: The control signal processor on the S-IU-7 Instrument Unit was found to be a non-flight item. In order to perform Control Rate Gyro System Checkout without schedule delay, it will be necessary that the proper control signal processor be received by April 20, 1964.

3. S-IV-7 PRE-STATIC CHECKOUT: Pre-Static checkout of the S-IV-7 stage continues at DAC, SACTO. Problems still exist with over 20 part shortages and with the hydraulic system; metal particles have been found in an actuator. Static firing is scheduled for April 17, 1964, which leaves insufficient time for pre-static Electro Magnetic Compatibility testing.

4. S-IV-9 POST-MANUFACTURING CHECKOUT: All tests on the S-IV-9 stage at DAC, Santa Monica have been conducted except simulated flight which is presently in process. Lack of spares to replace parts found defective during checkout has increased parts shortage from 55 to 66.

5. PERSONNEL TRANSFERS: The personnel data furnished in my NOTES 3-30-64 (copy attached) regarding transfers to and from Manufacturing Engineering Laboratory warrants some correction. One engineer has transferred from Quality and Reliability Assurance to Manufacturing Engineering and another is processing now. Five employees have transferred to this Laboratory from Manufacturing Engineering Laboratory. None of these people have been promoted, however, I appreciate Mr. Kuers' original position, as the inability to promote deserving, highly qualified personnel occupying responsible positions into existing vacancies in the grade structure above the GS-12 level is causing a morale problem and is going to result in loss of personnel also within this Laboratory. I regret the error in my first report, but this Laboratory does not keep records of closed personnel actions and the memory of the knowledgeable people turned out not to be reliable enough to cover exactly the specified period.

1 Enc:
Attachment (NOTES 3-30-64 GRAU) (Dr. von Braun's copies only)

NOTES 4-13-64 GRUENE B 4/20

SA-6 Status

a. We are generally on schedule with the pre-launch preparations of SA-6, and do not at the present time, foresee any major difficulties.

b. Intermediate Measuring System Status: Of the 765 S-I measurements, 621 were calibrated, and of the 210 I. U. measurements, 47 were calibrated. The following components had to be repaired: 15 Amplifiers, 28 Transducers, 2 Power Supplies, 4 Zone Boxes, and 26 miscellaneous items.

c. Command System Status: A combined study by LVO and Astrionics is still underway to eliminate Command System interference and determine guidelines for SA-6. After all means are evaluated and solution for the future can be presented, it is scheduled to invite Mr. Frank Lehan to participate in a workshop session. This will take place after April 24 because we want to get the results of our SA-6 RF compatibility test with AMR which is presently scheduled for April 24, 1964.

NOTES 4/13/64 HEIMBURG

1. F-1 ENGINE TESTING (STATIC TEST TOWER WEST): A propellant loading test was performed on the Static Test Tower West, 4/7. Objectives of this test were to determine the time rate at which the lox pump inlet temperature could be raised by tank pressurization and the GN_2 fuel bubbling flowrate necessary to break up the temperature stratification in the fuel suction line.

A test was conducted on 4/8 for a mainstage duration of 1.38 sec. This test was scheduled to be a lox-depletion test of approximately 40 sec. duration. However, cutoff was initiated prematurely when the recorded lox pump outlet pressure exceeded the redline value. It has been concluded that the measurement was in error.

A test was conducted on 4/9 for a mainstage duration of approximately 40 sec. This test was scheduled for lox-depletion at 40 sec., which was successfully achieved. For this test, a hot lox start (pump inlet temperature -275°F.) was made for the purpose of determining the effect of reduced lox density on the turbine inlet temperature spikes being experienced at engine start on the F-1 engine. Results of this one test indicate that a considerable reduction in the temperature spike is achieved by starting with the hotter lox.

Calculations have been made this week which show that gimballing of the F-1 engine of up to two degrees can be accomplished at the Static Test Tower West without overheating the deflector aspirator.

2. S-I STAGE TESTING (STATIC TEST TOWER EAST): S-I-9 stage was removed from the test stand on 4/8, after successfully completing its scheduled testing.

A recommendation by P&VE to refire S-I-9 to further investigate lox depletion characteristics to gain higher confidence for flight prediction was disapproved by Test Lab for the following reasons:

1. The additional data to be obtained were considered desirable and could not be termed mandatory by P&VE.
2. Final depletion evaluation must be obtained from flight tests and additional data will be gained from flights of SA-6 and SA-7.
3. SA-7 has no direct flight payload requirements and a change in center lox tank orifice to possibly improve lox depletion is not considered critical to achieve flight mission.
4. S-I-8 and S-I-10 static firings will be accomplished prior to SA-9 flight and should yield the desirable information.

3. SATURN V GROUND SUPPORT EQUIPMENT (GSE) TEST FACILITY: Reference NOTES 3/30 HEIMBURG (copy attached). A contract was negotiated with American Machine Foundry (AMF) on Wednesday, 4/8, for a ceiling of $1,280,000. This contract will be funded completely with R&D funds.

ATTACHMENT 1: NOTES 3/30/64 HEIMBURG (attached to Dr. von Braun's Copy Only)

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NOTES 4-13-64 HOELZER

No report.

JW 4/13

B9120.

NOTES 4-13-64 JAMES

Program Operating Plan - The Program Operating Plan for Saturn I/IB was submitted to FMO. The POP is due in Headquarters on April 15. Since the February 7 submission, Saturn I requirements were reduced by $42.0 Million in FY-65 and $3.0 Million in FY-66. Saturn IB FY-65 requirements were increased by 3.5 Million. ✓

S-IV Stage Contract - Internal MSFC meetings are being held in preparation for resumption of fee negotiation of contract realignment. DAC has been asked to meet with MSFC again on April 15. ✓

Saturn IB Performance (Not to be submitted to Headquarters) - We are projecting approximately 1,000 lbs. payload gain due to increase in H-1 engine Isp. The Engine Office is carrying the ball and expect effectivity by SA-205.

J-2 Engine mixture ratio change is anticipated to be effective on SA-201. Engine Office can accomodate the change if the stage can handle it. The full programmed mixture ratio effectivity (in-flight programming) is not yet known and will require incorporation of a timing device. Directive action is being prepared. ✓

We are reflecting 700 pound payload increase for SA-205 due to S-IVB tank pressure decrease in this month's performance report. This is another "borrowed item" and directive action is being prepared. ✓

S-IVB Automation - Fichtner and I were at DAC last week and discussed with Ted Smith and Bromberg, the problem we are having in getting DAC to phase in ATOLL on a reasonable cost and schedule. I believe the discussion was fruitful and expect Jack Bromberg to withdraw his previous letter and now recommend that ATOLL be phased in. ✓✓

Fichtner, Bob Young, and I met with Jack Bromberg and Ted Smith, DAC, last Wednesday on the problems of getting the stage and stage GSE control drawings to Fichtner in a timely manner. We agreed upon an approach and since DAC now sees the necessity for Fichtner having these drawings, it is hoped that the problem has been resolved. ✓

RCA-110 Computer - The procurement plan for follow-on buy of RCA 110 computers, which includes computers for Complex 34 and 37 at KSC, was signed off by Headquarters on April 7, 1964. Approval stipulates that no interim letter contract will be offered. A fixed-price contract with RCA must be negotiated and finalized by June, 1964, in order to dove-tail manufacturing and meet program commitments. This is a very tight schedule and hinges on timely completion of a qualified parts list. ✓

NOTES 4-13-64 Koelle

1. AIR FORCE OPERATIONS RESEARCH SYMPOSIUM: Mr. Voss and I represented NASA last week in San Bernadino, California at the above meeting. Senator Church (Idaho), Congressman Karth, six AF generals, and some 200 operations research specialists were in attendance. Our paper was very well received and our participation greatly appreciated. Best regards from Congressman Karth to the "old man."

HHK
Yes, let's pursue this line (& the 3 stage Sat IB (cont.) with all we've got
B

2. NASA LONG RANGE PLANNING EXERCISE: This activity is gaining momentum. On April 8 and 9, Mr. Huber attended meetings of Milt Rosen's Launch Vehicle Subgroup of the Planning Task Group, that has been established to answer President Johnson's letter. There appears to be general agreement, in the area of future launch vehicles, on the 10-passenger reusable orbital transport, the Post-SATURN, and an improved SATURN V. The principle areas of discussion seem to be the role of nuclear propulsion in the 1970 to 1980 time period and the 3-stage SATURN IB. Dick Morrison made a big pitch for a 40K H_2/F_2 stage that could be used on TITAN II, TITAN III and almost every other vehicle. Les Fero, of course, sided with our opinion on using the CENTAUR.

It appears that the May 1 answer to the President will be very general, since Webb has stated that he did not want to say anything in May that he would have to retract in September. The main questions to be answered are: (a) How well can our existing vehicles fulfill our needs, and (b) What new vehicles are desirable?

This week there will be a two-day working session with Doug Lord in the mission planning area. Mr. Voss and I will attend. The RAND Corporation will also be represented by some cost people under contract with Headquarters. I would like to quote two sentences from Mr. Webb's directive to Dr. Seamans on this subject, for general consumption, as they seem to be of significance and indicate a shift in policy.

Yes, that's the MSC line at Hq.) so they can switch the tack as the Congressional winds change
B

"The work of the task group for future programs should be aimed at providing management with the various alternative objectives and missions, and their associated costs and consequences rather than detailed definition of a single specific long term program."

"A way must be found to project both schedule and cost data for a variety of combinations of missions."

NOTES 4-13-64 KUERS

Saturn V, S-IC-T Stage:

a. Almost no progress was made last week in the fabrication of Fuel and Lox containers for -T. The major reason for this time loss was a breakdown of the welding equipment in the tower building as well as at the Meridian bulkhead welder. The welding equipment is such precision equipment that it is very sensitive to the slightest disturbances by magnetic fields, mixture ratio of shielding gas, etc., resulting in erratic performances of the machine and non-uniform weld quality. By exchanging of equipment, changing the grounding systems, and changing the gas mixing valves we believe to be operational again.

b. The S-IC Program is suffering more and more serious delays. The underlying causes for this situation lie not so much in manufacturing problems--though this is definitely a contributing factor--but in shortcomings of design capability of Boeing Saturn Booster Branch. Last week we received 1165 EO's from Boeing!

NOTES 4-13-64 MAUS

Negative Report

4/13

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NOTES 4-13-64 McCartney

1. R&D OPERATIONS BALANCE OF FY-64 FUNDS (Dollars in Millions):

	Sat I	Sat IB	Sat V	Total
Uninitiated Bal	8.1	15.3	17.1	40.5
Identified Rqmts	1.9	4.3	10.1	16.3
Unidentified Rqmts	6.2	11.0	7.0	24.2
Of the unidentified requirements, there are:				
In Blocked Accounts	2.1	5.3	3.4	10.8
In Labs	4.1	5.7	3.6	13.4
Unidentified Rqmts	6.2	11.0	7.0	24.2

Unless unforeseen lab requirements develop today, a request will be made to Executive Staff to allow pre-financing of selected major contracts into FY-65 so the total R&D Operations funds can be obligated by June 30.

2. R&D OPERATIONS DIRECTOR'S COMPOSITE REVIEW: On April 10, personnel from my office made the Director's Composite Review presentations, summarizing and analyzing results of the recent R&D Operations Director's reviews. Mr. Napper of my office is coordinating follow-up on problem areas. Except for that follow-up activity, the Composite Review concluded the current R&D Operations Director's Review.

3. FY-64 REPAIR AND ALTERATIONS PROGRAM: FMO has provided $2.1M Administrative Operations funds to the Facilities & Design Office to cover those Repair & Alteration projects which, originally, would have used R&D funds.

4. FACILITIES UTILIZATION AND PLANNING STUDIES: Last week, a representative from my Facilities and Materials Group, the Assistant Director for Facilities, and representatives of the Executive Staff and the F&D Office met to discuss support for NASA Headquarter's "Center Development Planning" requirements. As mentioned in last week's Notes, we have contacted the laboratories for information on current and committed usage and planned future usage of R&D Operations facilities. We expect to receive and consolidate the bulk of this information in a few months; when collected, the information should fully satisfy all Marshall/NASA Headquarter's requirements in the facilities utilization and planning area.

NOTES 4/13/64 RUDOLPH

1. Bermuda - AZUSA - Results of MSFC review of requirements for tracking accuracies reflect agreement as to the need and justification in accordance with our philosophy of development and instrumentation. Dr. Rees took the final position under advisement for further examination of philosophy. Mr. John Frank, Consultant from STL, was unable to attend.

2. Configuration Management - STL made an unsolicited proposal to assist MSFC in review and evaluation, methods and procedures and preparation of implementation plans relating to the NASA version of Configuration Management Manual under initial preparation by MSF. The proposal was for 1-1/2 man year effort estimated at approximately $100,000. Presently Boeing has a task assignment and is supporting this effort. The missions of these support efforts are being analyzed to determine the proper approach.

3. S-IC Stage:

Qualified Parts - Boeing is reviewing a list of vehicle electrical components now under qualification by DAC. This review is being made to eliminate duplicating qualification tests of S-IC components that are common with the S-IVB Stage.

Tank Skin Corrosion - Pitting, due to corrosion, has been observed on three tank skin segments of Wichita. Skins were etched and rinsed subsequent to dye penetrant inspection and stored in a dehumidified area prior to conversion coating with Iredite 1200. After approximately five days storage evidence of corrosion was observed. The cause of pitting is suspected to be due to poor rinsing of handling fixture after etch to remove dye penetrant. Droplets of etchant trapped in the handling fixture fall on the cleaned skin thus causing pitting. Skins have been flash cleaned and conversion coated to prevent further corrosion. Immediate steps have been taken to properly rinse handling fixture to prevent reoccurrence of above corrosion problem.

4. S-IVB Stage:

Control Drawings - Detailed review was held at DAC attended by Mr. Fichtner, Mr. Young, Col. James and Mr. Godfrey to resolve procedures to be followed in Electrical Control drawings. Details of results are furnished in Saturn IB report.

Battleship Engine - The first J-2 engine for the Battleship firing test program has been accepted by NASA at Rocketdyne and is expected to be delivered to DAC on 21 April 1964.

NOTES-4-13-64-SHEPHERD

B 4120

Engineering and Administration Building: The Engineering and Administration Building or first addition to the Central Laboratory and Office Building, located southeast of your office, was partially occupied April 6. Moves will continue through the remainder of this month. A comparison of these two buildings presents a rather interesting picture. As you may recall, the Architect-Engineer for both buildings was Wyatt C. Hedrick of Fort Worth, Texas. The first building required design time of 6 months, the second building 4 months. The construction time of the first building was 20 1/2 months and with the second, 15 months. These differences in time are attributable mainly to: (a) better MSFC organization (b) use of PERT on the second building, and (d) mainly the difference in capabilities of the construction contractors. Both contractors, Electronics and Missile Facilities, Inc. and Pearce & Gresham were selected by the formal advertisement-low bid process. The Electronics and Missile Facilities, Inc. performance was very unsatisfactory; Pearce & Gresham was very satisfactory. The third addition, or Project Engineering Office Building, is scheduled to be occupied August 1, 1965. Bids have not been opened.

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NOTES 4-13-64 Stuhlinger

1. METEOROID SENSOR FOR MMC: It was decided on April 2, 1964, that the MMC will use only sensors developed by Schjeldahl. FSC will discontinue its sensor development. This decision was made on the basis of better quality of Schjeldahl sensors. ✓

2. ACCEPTANCE TEST PLAN FOR MMC-COMPONENTS: A plan has been given to NASA Headquarters which establishes the acceptance criteria and the methods of acceptance testing applicable to the meteoroid penetration detection system (MPDS) to be used on the Meteoroid Measurement Capsule (MMC). Acceptance tests to determine the probability of registration of a "hit" due to a radiation induced discharge will begin by April 13 and be completed by June 15, 1964. Penetration tests of the meteoroid sensor will begin May 10 and be completed by June 15. ✓

3. SHIELDING STUDIES: A study has been initiated in the Nuclear and Plasma Physics Branch to compare and evaluate various shielding methods by applying them to standard shielding problems of space capsules. We are trying to apply some of the remaining RIFT supporting research money to this purpose. ✓

4. ORION: It appears that ORION will be encouraged, but not funded by OART in FY-65. The experiment work related to ORION is expected to be handled between the AF and the AEC. ✓ Existing FY-64 money will be used to conduct mission and systems studies at MSFC (FPO) during the coming year.

5. NASA REPORT ON INTERNATIONAL UNITS: At the request of the Technical Publications Branch of Headquarters, Dr. Mechtly, Chief, Scientific Flight Payloads Branch, has drafted a report "The International System of Units, Physical Constants, and Conversion Factors." This report will be given NASA-wide distribution. ✓

RPL
I'd like to have a copy for my own use
B

6. SRT PROGRAM STATUS: The status of the portion of the SRT program managed by RPL is, as of April 10, 1964, as follows:

	ANNUAL PLAN	AUTHORIZED	PROCESSED TO FMO	OBLIGATED
OART	10,498,000	10,498,000	8,258,400	1,913,200
OMSF	14,163,000	14,133,000	12,136,036	360,184
OSSA	675,000	675,000	637,912	17,265
TOTAL	25,336,000	25,306,000	21,032,348 ✓	2,290,649

An additional $249K program authority has been received from OART ($53K - Nuclear Electric Systems; $121K - Electronic Systems; and $75K - Research). ✓

April 20, 1964

Bormon

NOTES TO MUELLER 4-21-64 DEBUS

1. SPIN TEST INCIDENT: The Air Force accident board has been formed in connection with the 14 April accident. Colonel E. R. Manierre is the Air Force President. The Goddard representative is Mr. Donald C. Sheppard of Goddard Launch Operations Branch. Major Learmonth is appointed as consultant to the board.

2. LABOR SITUATION: UPGWA have indicated in Federal Court on 10 April 1964 that they will restrain picketing for six months.

Ironworkers and contractors have reached an agreement regarding labor contract.

Project Stabilization Agreement has been signed.

NASA Headquarters has lifted restrictions on awarding contracts and issuing notices to proceed. The Corps of Engineers was so notified on 15 April 1964. The restrictions were put into effect on 31 March 1964 and delayed completion on the following contracts:

a. Cable Terminal Building and communications ducts, MILA - 10 days

b. Extension of utilities, Cape Kennedy - 14 days

3. VAB CONSTRUCTION: Although it was necessary to extend the steel erection contract (American Bridge) 31 days because of URSAM design changes, the Corps of Engineers has assured us that this would not affect the outfitting contractors (Morrison-Knudsen) completion date for the high bay portion of the VAB. Since we had originally established an earlier BOD for the low bay portion, the American Bridge time extension did affect these dates. However, as a result of the reduction in equipment installation time required for the modified S-II/S-IVB low bay checkout plus the rescheduling of the Facility Checkout Vehicle arrival from July to January, we were able to extend this BOD portion of the contract. Holding to the original low bay BOD would have cost an additional $65,000.

4. HYDROGEN LEAK DETECTOR: has been procured and will be field-tested on Complex 37. Prototype will be used to monitor potential leak areas on umbilical tower LH_2 sled, swing arm, fill and drain lines near umbilical tower and hydrogen G. S. E.

5. GAO EXAMINATION OF CONSTRUCTION OF VAB: will begin April 28, 1964.

6. TEST OF FIRST 2,000 KW, D.C., DIESEL-GENERATOR SET FOR SATURN V CRAWLER-TRANSPORTER: On April 6, 1964, a run-in test was conducted at Alco Products Incorporated, Auburn, New York, on the Alco model 251-B diesel engine and two General Electric 1000 kw, d.c. generators all assembled on a common support base; this equipment was tested at 1000 rpm using a water rheostat as the external load source. On April 7 - 8, this assembled unit was subjected to torsiograph testing throughout the load range and speed of the engine. The run-in test was performed satisfactorily after necessary adjustments were made to the engine's governor, fuel pumps, etc. This first diesel-generator set is tentatively scheduled for shipment to Cape Kennedy in May 1964. A total of four of these diesel-generator sets will be supplied by General Electric Company for the crawler-transporter.

7. SHIPMENT OF CRAWLER-TRANSPORTER COMPONENTS: The initial rail shipment of components to MILA has begun. Two carloads were dispatched on April 8 and one carload on April 9.

8. MSI - GSA VEHICLES AND MOTOR POOL SERVICES CONTRACT: The transfer agreement with GSA was concurred in by Base Operations Division, Transportation Pdicy Office, Resources Office, Legal Office, Financial Management Office, and the Deputy Director. It was executed by the Contracting Officer on April 14. This completes the official transfer of motor pool operations and KSC contract leased vehicles to GSA.

9. TELEMETRY: Computer processed telemetry data (4020 plots) and oscillographs were furnished Project FIRE in accordance with the request of Langley Research Center. Further processing will be done on Ascension data this week. The telemetry support of Centaur requested by GSFC and Lewis was delayed until next week because of vehicle problems.

10. CATALYTIC - NAS10-1138: Union Carbide Corp., of which the Linde Co. is a subsidiary, has informally protested the possible award of an order by Catalytic to Air Products, Inc. for vacuum jacketed lines. Catalytic is a wholly owned subsidiary of Air Products. The basis of the protest is alleged "conflict of interest." Air Products renders cryogenic engineering services support to KSC, and Catalytic holds the contract for propellant management services, Complex 39. The problem is not new, having been raised with OMSF prior to awarding the Catalytic contract. The matter is again being reviewed by the KSC Legal Office, and our position will be made known to Union Carbide about April 17. A formal protest can be expected if we decide not to take a hard stand with Catalytic.

11. ECONOMY BLUEPRINT - NAW10-257: The final Audit report was received April 13, and establishes the amount of $66, 849. 13 as overpayment attributed to vacation and holiday pay. The formal notice will be issued by April 17. We can expect the company to seek legal remedies for relief. This could include the NASA Contract Adjustment Board at Headquarters.

12. GAO RESIDENCY ESTABLISHED: Mr. J. Ronald Hudson is assigned now and John F. Smith will arrive April 28, 1964 to begin audit work. It is planned to place the Resident Office in the Cocoa Beach vicinity.

13. EQUAL EMPLOYMENT OPPORTUNITY: A male Negro clerk-typist, GS-3, was employed under a 700-hour appointment on April 9, 1964 for the Administrative Clerical Pool. He is to give clerical support to MSC on a special project. This makes a total of 8 Negro employees at KSC.

NOTES 4-20-64 BELEW

B 4/26

J-2 ENGINE PROGRAM

Negotiation with Rocketdyne for 55 production engines has been in process since Monday, April 13. It is anticipated that negotiation of the scope of work will be completed this week and that negotiation of cost will commence the first of next week.

A meeting is scheduled for April 21 with Rocketdyne to review the pre-PFRT test results prior to starting PFRT.

An open-air hydrogen explosion occurred on test stand Delta-2A during second shift operation on April 15. Cause of the explosion has not been determined. Minor damage was sustained by the test stand.

RL10 ENGINE PROGRAM

We have agreed with the Lewis Research Center that they will start picking up part of the tab for RL10 Engine Development allowing us to proportionately reduce the MSF budgeting for this program. I discussed this with Dr. Mueller during his visit here last week, and he agrees that this approach is satisfactory.

We are gradually phasing-out the East Hartford Pratt & Whitney plant in keeping with the reduced production requirements. RL10 operations there will be completely phased out by December 1964 unless new production requirements develop. The Florida plant can handle up to two to three engines per month if delivery rates stay this low.

Personnel from Lockheed have approached us to obtain temporary use of two RL10A-3 hard mockups in support of their company funded studies on cryogenic stages. Spares or used engines which may drop-out of the Saturn and Centaur Programs could be used for this purpose if the Center supports this type effort. Yes. B

F-1 ENGINE PROGRAM

Rocketdyne was given the go ahead with the redesign and modification to the flame deflector on test stand 1A at RETS (EAFB). The redesign concept and approach was reviewed by Test Laboratory and general concurrence given to Rocketdyne's recommended approach. This consisted of adding a 24-foot long lip extension to the present flame deflector, to turn the exhaust flame to 10 degrees above the horizontal.

Efforts to explain the turbopump explosion which took place in late February are continuing with LOX pump impeller fatigue the prime suspect area. A meeting of the F-1 turbopump Ad Hoc Team will take place the latter part of April, with participation from this office, P&VE Laboratory, Test Laboratory, and Lewis Research Center for a review of status.

H-1 ENGINE PROGRAM

Preliminary investigation has revealed that the earliest effectivity of the rerouted inboard turbine exhaust system is vehicle S-IB-203. Further investigation into the possibility of retrofitting the proposed high performance injector to vehicle S-IB-203 is in progress.

R&D engine H-119D which is identical to the final 200K engine configuration is currently in test and has accumulated 1,120 seconds in 8 tests. All redesigned hardware continues to perform satisfactorily.

B 4/20

NOTES 4-20-64 CLINE

1. S-IV VEHICLE MECHANICAL DESIGN INTEGRATION WORKING GROUP MEETING: The S-IV Vehicle Mechanical Design Integration Working Group meeting convened 4-14-64. The primary purpose of the meeting was to solve the orbital rolling and tumbling problem of the S-IV Stage and the Micrometeoroid Capsule. The members agreed to the following rule: An acceleration rate of 0.15 degrees per second with a total velocity rate at the end of the venting period of not more than six degrees per second.

2. DOUGLAS AIRCRAFT COMPANY 1P SPECIFICATIONS: A total of ninety-seven 1P-type specifications have been received without deviation requests. Twenty-one specifications have been approved; 22 may be approved if revised; 4 have been disapproved; and 50 are scheduled for review.

3. SA-7 ON-TIME LAUNCH: An effort to determine the desirability and feasibility of attempting an on-time launch of SA-7 has been initiated. Initial contacts with Astrionics Laboratory and Saturn I/IB Project Office personnel indicate sufficient interest to warrant a launch-on-time attempt provided test objectives are in no way jeopardized. The objective would be to launch into an orbit that is coplanar with an actual or fictitious target orbit. SA-5, SA-6, or the Gemini boilerplate payloads would be representative of typical targets. Such a rendezvous simulation would establish the feasibility and confidence in the Saturn IB for rendezvous missions. No actual guidance exercise is proposed.

NOTES 4/20/64 CONSTAN

1. SHIPMENT OF SA-8

SA-8 was shipped from the Michoud Plant to Huntsville, Alabama for static firing on April 17, 1964. Approximate transportation time is seven days.

JW 4/20

B 9/25

NOTES 4/20/64 FORTUNE

1. MTF Planning Board - met at MTO Monday, April 13, after rough Gulfstream ride. Tour of all facilities under construction preceded meeting.

2. FY-65 GE Contract - is nearing final review by Huntsville and Mississippi personnel. Henry Auter was down Monday and Tuesday; planning, scope, work statements are pretty well defined so that May 4 should mark beginning of negotiations with GE at MTO. Preliminary indications are that GE's manpower build-up is in line with Activation Group thinking.

3. Governor's Educational Committee - met Wednesday in Jackson. Resolution was drafted that need did exist in southern Mississippi for a technical education program requiring cooperative effort among Mississippi State University and the junior colleges. Hopefully, the Manpower Development Training Act can be utilized to provide interim needs for GE, NAA and Boeing until an Institute of Technical Training becomes effectual. An MDTA meeting is scheduled Tuesday, April 21, at Marshall.

4. NASA-GE Bi-Weekly Meeting - was held Friday in Huntsville. These meetings present excellent opportunity to thresh out areas of misunderstanding and have helped greatly, I believe, in bringing GE closer in line with MSFC philosophies.

JW 4/20

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NOTES 4/20/64 GEISSLER

1. Aero-Astrodynamics Fluid Mechanics Facility: As a result of the meeting with Dr. Mueller on April 15 re: "The Fluid Mechanics Facility," a briefing folder was prepared for him. Hopefully this folder can be placed in Dr. Mueller's hands at the next Management Council Meeting. Assuming Dr. Rees and Mr. Shepherd concur, the folder will be available for you to carry to the meeting next week.

2. Project LIEF: OMSF (Lilly) has requested a joint KSC-MSFC re-evaluation and revision of our project LIEF proposal which was originally approved on August 9, 1963. Independently, we also received informally a new internal KSC implementation plan for LIEF. Dr. Speer will take action with Mr. Bertram (KSC) to initiate such revision. The objective is to reduce our joint requirements to a reasonable minimum. However, unless instructed otherwise, we will insist on the MSFC requirement for a few hours one-way TV from KSC to MSFC for each launch with a possibility to increase the coverage. The project LIEF revision will also include the new requirements for our support role to Houston IMCC.

OMSF Ltr will put in letter to Mueller JW

3. Bermuda Tracking Station: A discussion of the need for redundancy and improved accuracy of Bermuda tracking for the Saturn IB and V program was held with Dr. Mueller, and MSF personnel during their visit on April 16. Dr. Speer presented the reasons for improved instrumentation and outlined several possible solutions. Dr. Mueller approved the placement of an FPQ-6 type radar on Bermuda. Action is being taken to reflect this agreement in MSFC instrumentation requirements documentation.

NOTES 4-20-64 GRAU

B 4/26

1. S-I-7 POST-STATIC CHECKOUT: Instrumentation checkout of the S-I-7 stage was completed 4-13-64. Checkout of the vehicle was discontinued from 4-14 until 4-17-64 waiting E.O. installation on the main distributor and two measuring distributors. Electro Magnetic Compatibility testing is in process and preparations for Simulated Plug Drop testing is in process.

2. S-IU-7 INSTRUMENT UNIT CHECKOUT: During removal of the control distributor from the S-IU-7 Instrument Unit for E.O. installation, a burned wire was discovered. Investigation revealed that a temporary short had occurred, due to human error, during measurement simulation of a missing component. Modification and rework of the distributor is expected to be complete 4-24-64; testing of the Instrument Unit can then be resumed. Impact, if any, on the checkout release date is being evaluated.

3. S-IV STAGES: The S-IV-8 stage was moved from the assembly area to the checkout area on April 13, 1964. Checkout will not begin until assembly is satisfactorily completed. Approximately 100 part shortages presently exist on this stage. Post-manufacturing checkout of the S-IV-9 stage was completed up to the shortages on April 11, 1964. There are presently 68 part shortages on this stage. Between April 11 and April 27, 1964, modifications will be installed at Sacramento on a parts available basis. The S-IV-10 stage is in assembly but being delayed by approximately 200 part shortages.

4. F-1 ENGINE TESTING: Receiving inspection and test of F-1002 Engine was concluded April 14, 1964, to deliver the engine to Test Laboratory. During the two (2) weeks the engine was in this Laboratory, test procedures were reviewed and facilities were verified. Minor test procedure changes will be made to facilitate checkout of Block II Engine.

7w4/20

B 9/26

NOTES 4-20-64 GRUENE

*1w SA-6 Status: SA-6 checkout operations are proceeding according to our Daily Work Schedule. The following problems were encountered and are being resolved.

a. The Calmec valve (cold helium bubbling, mentioned by Mr. Cline in his last week's notes) arrived at the Cape and is being installed. No delay expected. ✓ LAST FROM TWR

b. It was determined that the local Douglas personnel used a non-calibrated crimping tool when they replaced certain defective wiring. It was decided that all wiring replaced by Douglas at the Cape will be exchanged for satisfactory wiring utilizing the proper crimping tool. (R-QUAL is with us on this problem.) ✓

b. An erroneous guidance computer pre-flight checkout program caused a delay in finishing our control tests. The error was found and corrected in the program. A small part of the control test will have to be delayed but will not cause any launch delay. ✓

NOTES 4/20/64 HAEUSSERMANN

1. SATURN I GUIDANCE COMPUTER: An investigation of the Saturn I Guidance Computer drum failure on 4/4 has revealed a system discrepancy between the computer and GSP-24. When a power failure occured during operation, the emergency head-raising circuitry failed to function properly. There is a possibility that other drums have been damaged because of this. Our records indicate that only two computers (S/N 09 and 11) have not experienced power failures which operating with the GSP-24. As a result, all suspected drums will be returned to IBM for re-qualification. Computer allocations and schedules are being juggled because of this.

An external circuit has been designed to remedy the discrepancy. It is now undergoing tests in the lab and will be checked out in the Breadboard system. If approval is given, the circuit can be installed in the Breadboard, Quality Laboratory, I.U. Checkout Area, and at the Cape.

2. S-IU-500FS: DAC proposes in their "Feasibility Study for Environmental Testing of a Saturn IB/V Type Instrument Unit" to use an S-IVB Forward Stage Simulator and an Apollo Thermal Simulator. The DAC estimated cost of $2.5 million is approximately the amount which MSFC has budgeted for this task which includes DAC accomplishing and/or providing:

a. The design and fabrication of both the S-IVB and Apollo simulators

b. A complete set of Astrionics equipment for the S-IVB forward stage

c. Test operations in the space simulator (This includes chamber rental, DAC manpower, etc.)

I.O. is presently writing a statement of work that can be used for an MSFC contract with DAC to perform the test during the summer of 1965.

3. PLATFORM ERROR ANALYSIS: Our comparative platform error analysis presented to Dr. Mueller on 4/16 comparing the MIT system, the specificiation, and the MSFC system has been reconfirmed by Belcomm. In fact, they feel that we were very generous with MIT. The difference in performance of the hardware systems results from the physical differences in the two systems; such as, azimuth alignment methods and gyro wheel charateristics, and not in anyone's conservatism or optimism in quoting performance figures. The MIT system has been optimized for the latter phases of the mission, and it cannot be expected to compete too favorably with ours in the launch phase. Comparison of Boost Phase Error Analysis will be forwarded as a separate submission.

NOTES 4/20/64 HEIMBURG

1. F-1 ENGINE TESTING (STATIC TEST TOWER WEST):

A test was conducted on 4/14 for a mainstage duration of 42.26 seconds, with cutoff being initiated by lox depletion. Engine inspection after the test found pieces of the lox prevalve lip seal protruding through the main injector. This seal has failed previously during components testing. A new seal has already been designed and is due at MSFC on 4/21. The engine (F-1001) has been removed from the stand and is being partially disassembled to recover the missing lip seal pieces.

Engine F-1002 has completed Quality and Reliability Assurance Laboratory receiving inspection, and is currently being partially disassembled in the Engine Prep Shop in order to inspect for internal cracks in the pump high pressure discharge and fuel pump inlet ducts. This inspection is being made at the request of Rocketdyne, because they have been finding cracks in their ducts on their R&D engines.

2. SATURN V MODEL CLUSTER TEST:

The buildup of the 1:20-scale Saturn V model cluster has been completed (5 x 4,000 pounds thrust for sound suppression purposes). The engine start and shutoff sequencing has been satisfactorily solved and systems checkout and confidence runs have been performed with 1, 3, and 5 engines. On 4/11, two 20-second baseline tests were conducted utilizing a Fondu-Fyre-coated dry deflector for baseline noise measurements.

3. MTF WORKING GROUP:

A meeting was held with NASA Headquarters personnel to determine the design criteria for the I-10 Bridge. Test Laboratory's position is that a low-level bascule-type bridge will be satisfactory, provided that bridge opening is unrestricted at all times. We have analyzed various modes of barge towing and have found that tugs with elevated wheelhouses are preferred to individual remote control stations mounted on the barge. Utilizing this concept, a vertical clearance of 67 feet at the bridge would be required. This clearance requirement makes the use of a bascule bridge more economical than the buildup of a fixed bridge designed to provide this clearance.

4. MARINE TRANSPORTATION:

A request for quotation for reactivation of the barge Palaemon is presently being prepared by Test Laboratory. Following reactivation, the Palaemon will be turned over to Project Logistics Office for operation.

NOTES 4-20-64 HOELZER

Negative Report

NOTES 4-20-64 JAMES

SATURN I - SA-6 - Electrical mating of the spacecraft and launch vehicle is scheduled today. Checkout is proceeding toward the scheduled launch date.

S-IV-7 - Static firing of S-IV-7 was postponed from April 17 to April 21 to allow for inspection of the hydrogen suction ducts to determine whether missing plastic caps were in the ducts and to allow the crew to rest. It was determined that the plastic caps had been removed from the suction ducts. Every effort is being exerted to maintain the delivery schedule to KSC to prevent slippage of SA-7.

S-I-8 - An MSFC/CCSD status review of S-I-8 was held at Michoud last Wednesday. Although several engineering orders will not be incorporated until after static test, MSFC personnel were satisfied with the completion status of the stage for static test. The stage was shipped by barge last Friday and should arrive at Huntsville this Friday, April 24 for static test operation.

S-IVB Dynamics Test Stage - During acceptance proof testing on April 14, 1964 the forward LH_2 dome was wrinkled. The exact cause of the damage is not yet known, but is assumed to be a negative internal pressure. There is a depression, about one foot from the dollar weld, which measures approximately three (3) feet long, eighteen inches wide, and six to eight inches deep. In addition, there is an elongated depression, about eighteen inches long, two inches wide, and one inch deep between the large depression and the tank and Forward Dome Seam Weld. Also, there are some wrinkles approximately 180 degrees around the dome from the depressions. NASA and AFQC have impounded the area and are attempting to obtain available records for analysis of the cause. DAC, NASA, and AF are meeting to determine the cause of failure and the impact of the damage to the program.

SA-201 and 202 Launch Restrictions - AERO and P&VE have been requested to determine the necessary launch restrictions or other steps to be taken to insure the integrity of the lighter S-IVB aft skirt on SA-201 [redacted]. Douglas has stated the redesign of the aft skirt will not be available until SA-203, but the redesigned forward skirt and aft interstage will be incorporated on SA-201.

SA-201 Loads Analysis - AERO and P&VE are presently verifying the load carrying capability of SA-201 in view of the lighter design S-IVB aft skirt. AERO provided the trajectory and control data to P&VE this week and P&VE should have the answer by the end of next week.

MSFC Approval of DAC Drawings - When DAC was here for one of our previous meetings, they raised considerable discussion on the status of subject approval. This note is to inform all concerned of the present status. You may recall that almost simultaneously with this problem, Mr. Neubert had a similar problem on the S-II Stage and a task force was set up to expedite approval for both the S-II Stage and the S-IVB Stage. The present status is that all of the deviation requests to specifications known to MSFC have been acted upon. Also, there is no backlog on the 1-P drawings submitted by DAC. The only remaining activity in this area is to up-date some out-of-date specifications and the special task force will work on these next.

Fw 4/26

NOTES 4-20-64 Koelle B 4/26

1. PROCUREMENT ACTIONS - FY 1964: We have met the initiation deadline of April 15 for all of our procurements. If P&C keeps their promise, we should have all of our funds obligated by June 30, 1964. It will probably be a close shave because we have to go back once again to Dr. Mueller for negotiation authority after proposal evaluation.

2. DR. SEAMANS' BRIEFING: I have received advanced notice that Dr. Seamans wants to have a briefing on reusable launch vehicles in about 3 to 4 weeks. The briefing is supposed to last only 30 minutes. This will allow us to state only the key issues. I plan to give that presentation myself. Do you have any guidance on what to emphasize, and what not?

position paper available from Koelle — attached. Will read it as soon as possible. B

3. NUCLEAR PULSE: Our position paper on the above subject is back from the printer and will be distributed this week. We will draft a cover letter, for your signature, enclosing the copies going to Dr. Mueller.

4. PLANNING EXERCISE: We have spent two days in Washington with various working groups to assist in answering President Johnson's request for a NASA long-range plan for the 1970's and beyond. A tentative answer is due on May 1. This letter, however, will be relatively short and noncommittal.

I've read it, made my suggestions. I think it's o.k. B

Our main contribution for the next go-around (deadline August 1) seems to be to integrate all the individual plans and to come up with consistent mission yield and program cost data.

Any time you are interested in going into details, I am ready. Due to the nature of our contribution, I think that I can handle the job with the resources available in my office.

Have just read it! I think it's excellent. Suggest to use some slides as you present the various configurations, so Seamans can see how much work has gone into this. I'd love to be present during your presentation. B

NOTES 4-20-64 KUERS

1. Apollo Command Module: MSC has called for support on manufacturing problems encountered at NAA on the structure of the Command Module. Last Monday I had a brief discussion with MSC and NAA personnel at LA where I was told that the existing tooling did not produce sub-assemblies within the tolerance requirements and that for this reason manufacture of this structure was at a standstill for approximately 6 weeks. To alleviate this situation NAA has proposed a tool improvement program by which 64 of the major tools will have to be modified, resulting in a 20 week schedule slip. Subsequent to this discussion we had meetings with NAA in which we reviewed and appraised the entire tool improvement program. We found that the new concept is sound and represents a substantial improvement. We were, however, able to propose some additional improvements which NAA and MSC have accepted. MSC wants us to continue in this support for some time in order to follow up on details and evaluate the results. The experience in tooling and manufacturing gained from our in-house program pays off in this case.

2. Visitors from DAC: Messrs. N. Shappell, Director of Manufacturing, and S. P. Dillon, Assistant Director of Operations, visited with us Thursday. In the afternoon tours through Test Laboratory and Quality and Reliability Assurance Laboratory were arranged.

3. S-IC-T Stage: We succeeded in making the close-out weld on the Fuel Container with good results.

FW 4/20

NOTES 4-20-64 MAUS B 9/26

1. APOLLO MANPOWER REQUIREMENTS - We get numerous requests from headquarters for statistics and forecasts on manpower requirements. The latest request was received April 13 from Gen. Phillips, MSF. He asked that we submit by April 15 estimates for the Apollo program, broken down to project level by man-months for FY64, and by man-years through FY70.

   Since accurate estimates will require a little time, we have requested delay in submission until the May Program Review. ✓

2. WAGE-BOARD - APPRENTICE PROGRAM - The last two apprentices have finally advanced to the journeyman level; this concludes the MSFC wage board apprentice program. ✓

3. CONGRESSIONAL MATTERS - In regard to the Mahon-Ford (of the House Appropriations Committee) visit, Ray Kline has learned that the visitors would like to spend a minimum of time in the briefing room and a maximum of time visiting our facilities. Ray is developing the program and dealing with Bart Slattery on logistics arrangements. ✓

   A rough draft of your proposed statement to the Pucinski Committee was delivered to Washington at 8 a.m. on Monday, April 20, for review by NASA headquarters and the Bureau of the Budget. It is due back here on April 23. ✓

4. REPORTS SURVEY REQUESTED BY PRESIDENT JOHNSON - President Johnson has requested the Administrator of NASA, along with the heads of other executive agencies, to take steps to simplify and eliminate reports to the government. The Director of the Bureau of the Budget has issued guidelines for this special review. ✓

   Chris Andressen will coordinate this study locally, and with headquarters, MSF (Bothmer). ✓

5. LINGLE REVIEW OF MANPOWER UTILIZATION - As you probably know, Walter Lingle was here last Friday, April 17, to review our manpower requirements for FY64 - FY66. He also attended (with many MSFC supervisors) the presentations given by Dr. Rees, Mr. Newby, and Dr. McCall in the Morris Auditorium on In-House Support Contractor Plans to Supervisors.

   He appeared to be very favorably impressed with MSFC's approach to manpower planning and control as compared with other Centers he had visited, such as KSC, MSC, Lewis, and Goddard. ✓

NOTES 4-20-64 McCartney

1. MANPOWER CONTROL: My office has been using the new contractor manpower controls to develop a set of Personnel Allocations for R&D Operations Laboratories and Offices. This week we will explain these allocations to R&D Operations elements and check for completeness. Official allocations are to be issued by May 1 and will include civil service, Type "A", and Type "B" contractor personnel.

2. FY-64 BUDGET EXECTUION: As reported last week, excess Saturn funds totalled $24M. These were to be used in pre-financing selected FY-65 major contracts. Last week, however, the laboratories and offices made a final strong effort to issue purchase requests against these funds. As a result, we cut deeply into the $24M excess. How deeply is not entirely clear at present, as FMO has been swamped with actions. To make sure we don't overdraw any of our accounts inadvertently, my office is holding some purchase requests until FMO can give us official balances; we expect to receive these on April 20. Our running estimates, however, indicate that all Saturn V funds will be used and that some I and IB funds will be available for the pre-financing actions. We will prepare a detailed plan for pre-financing as soon as the official balances are received.

NOTES 4/20/64 RUDOLPH

1. Bermuda Instrumentation - As a result of the meeting with Dr. Mueller in Huntsville on April 16, 1964, it is concluded that the Bermuda/Azusa station is out. Dr. Mueller agreed to increasing the radar coverage (FPQ-6) and steps are underway by Dr. Speer to adjust the on-board tracking hardware requirements to this decision.

2. Boeing Mission Support - The statement of work for the Saturn V (Boeing) mission support tasks was scheduled to be completed on April 15, 1964; R&DO review of the draft scope of work was scheduled for completion on April 10, 1964. To date, comments from the laboratories have not been received. Agreement was reached with R&DO to proceed on present draft scope. If major changes are necessary as result of further Laboratory reviews, the contracting by July 1, 1964 cannot be met.

3. Saturn V Launch Vehicle Brochure - A final draft on the "Saturn V Launch Vehicle" brochure has been submitted by Boeing. The finished brochure should be available in early May.

4. Saturn V "Pogo" Status - The Mechanical Design Integration Working Group meeting held April 15, 1964, among contractors, MSFC and MSC revealed the following status:

Boeing - Math Model made; recommended that hardware model be made and tested. A turbopump facility is needed and single engine test stand data is needed.

S&ID - No analysis made. Intentions are that analysis will be made only through direction from MSFC.

Douglas - Math Model made which shows that LOX system is near critical but fuel system is not critical. No specific testing recommended now, but studies should continue for possible damping methods.

Rocketdyne - Was not represented.

5. S-II Stage:

Propellant Utilization System (PU) - The retention of PU for S-II was established as an MSFC position on April 13, 1964 pending clarification of cost and schedules. The major discrepency involves DAC's proposal to S&ID for the common components. An analysis of this area is to be conducted this week.

Common Bulkhead - The initial fit-up of the upper facing plate for the first S-II stage common bulkhead has slipped from April 24 to May 13, 1964. The bulkhead completion date has slipped from June 12 to June 19, 1964. The above slippage was caused by an engineering change to the honeycomb configuration in the equatorial region and the requirement to accomplish approximately 8300 surface trace measurements on the upper and lower facing plates.

Jw 4/20

B 4/26

NOTES-4-20-64-SHEPHERD

Mississippi Test Operations - Corps of Engineers Staffing: General Welling of the South Atlantic Division, Corps of Engineers, Atlanta, visited briefly last Friday, April 17. His visit to Huntsville was in connection with a paper he delivered to the American Military Engineers. However, his visit to Marshall, I believe, was prompted by complaints to Col. Roberts and Col. Clema in regard to the above subject. General Welling was told that the staffing at the Mississippi Test Operations was a problem for the Corps of Engineers to solve, but that we were concerned that a number of key individuals were being changed during a relative short period of time. He was requested to take a personal look at this to ensure that an orderly transition was achieved in changing the people and that sufficient overlap existed so that management and technical continuity would remain at the site. ✓ It is my opinion that every personnel change that the Corps is making at the Mississippi Test Operations will strengthen their organization and their ability to execute their responsibility. ✓ The only complaint that we can have on this subject, providing sufficient overlap exists, is that the Corps should have staffed this way last June. Karl Heimburg discussed essentially the same points with General Welling. General Welling is receptive. ✓

Col. Wilhoyt has scheduled a trip to visit Huntsville on April 28 and 29. During his visit we will have a chance to discuss the same things with him personally. I believe that at this time, the point has been well made that we are concerned about the staffing changes planned for the Mississippi Test Operations. ✓

FW 4/10

B 4/26

NOTES 4-20-64 Stuhlinger

1. PROJECT POODLE: Bob Bussard, STL, gave a presentation at MSFC on an isotope-heated thrustor (Po-210; gaseous H_2; I_{sp} = 700 to 800 sec). The system could give a third S-IB stage an acceleration of about 10^{-3} g for several weeks, and an (ideal) velocity increment of about 25 km sec^{-1}. Design and operation are very simple. Will Jordan, FPO, and RPL will follow this project further. Would you like a 10 minute presentation in the Board Meeting? E.S. No. Rather to me personally. W.B.

2. DR. GIANNINI'S THERMO-IONIC PROPULSION SYSTEM: Giannini has succeeded in operating arc-jet type electric thrustors at 100 km sec^{-1} exhaust velocity ($I_{sp} \approx$ 10,000 sec); 200 km sec^{-1} appear possible. The chamber pressure is very low, and the gas acceleration is obviously augmented by a (j x B) effect. Power efficiencies are 60 to 80%. Although the theory is not well developed yet, the system seems to be a very promising new member of the electric thrustor family. ✓ Whatever that is B

3. STATUS OF MMC ELECTRONIC SYSTEMS: This past week FSC started final test and assembly of the prototype electronics subsystems. The power subsystem is complete and performed acceptably. The data subsystem was generally acceptable from the standpoint of data handling capability but must be re-worked to reduce radio frequency interference. The telemetry and communications subsystems are not yet completely assembled. The program for assembly and check-out remains on schedule and final prototype assembly should be finished by May 18, 1964. ✓

4. WITHDRAWAL OF $1.9 SRT FUNDS BY OART FOR MMC: The reprogramming of the $1.9M SRT funds directed by Dr. Bisplinghoff in his letter dated April 1, 1964, is being coordinated with the Executive Staff, Resources Management Office, and Financial Management Office. It appears that we will be able to fund most of our approved OART tasks in spite of this reprogramming action. ✓

5. SRT PROGRAM STATUS: The status of the SRT programs managed by RPL is, as of April 17, 1964, as follows:

	ANNUAL PLAN	AUTHORIZED	PROCESSED TO FMO	OBLIGATED
OART	$10,498,000	$10,498,000	$10,110,000	$1,999,700
OMSF	14,163,000	14,133,000	13,852,203	514,000
OSSA	675,000	675,000	665,859	17,265
	$25,336,000	$25,306,000	$24,628,062 ✓	$2,530,965 ✓

April 27, 1964

NOTES 4-27-64 BELEW

B 5/9

H-1 ENGINE PROGRAM

R&D engine H-119D which is identical to the final 200K engine configuration continues to perform satisfactorily. It has accumulated 2,240 seconds in 16 tests. This engine testing is significant since it represents qualification life on a final configuration 200K engine.

J-2 ENGINE PROGRAM

The open-air detonation on test stand Delta-2A, which was reported last week, apparently was caused by an inversion layer which prevented normal dispersion of the vented hydrogen from the fuel tank. Only minor damage resulted from the detonation and the stand was back in operation on April 18.

The main LOX valve failed to open during transition on a test on R&D engine J012, test stand Delta-2B, on April 18. This caused excessive heating in the gas generator and turbine drive system which resulted in essential loss of the gas generator, LH_2 pump turbine, hot gas crossover duct, and thrust chamber.

We have arranged a meeting between P&WA and Rocketdyne to interchange information on Facilities Hydrogen venting for Hydrogen Engine. Use of the P&WA system may prevent further recurrences of this type of incident.

Negotiations for the definitization of letter contract NAS8-5603 for the production of 55 engines have been underway for 2 weeks.

F-1 ENGINE PROGRAM

On April 21, 1964, at approximately 7:00 p.m., the turbopump on R&D engine 019 exploded. The malfunction occurred at 111 seconds of operation. This engine had been run previously some 750 seconds; however, the LOX pump impeller (believed to be a prime suspect) was replaced with one which had been run previously an accumulated approximately 400 seconds at the time of failure. A preliminary review of the records and hardware indicates the failure to be almost identical to that of the R&D engine 014 in February.

It is currently estimated that 3 to 4 weeks will be required to repair the 1B-1 position and approximately 1 week to repair the 1B-2 position. The blast screen between these two positions apparently contained the majority of the shrapnel and thus prevented any serious damage to R&D engine 020 which was in the other position.

Representatives from P&VE and Test Laboratories are at Rocketdyne to assist in the investigation as to possible causes. In addition, Messrs. Mel Hartman and Ambrose Ginsburg of LeRC have been contacted and will be at Rocketdyne, Monday, April 27. The MSFC F-1 Turbopump Ad Hoc Committee, chaired by H. Paul, organized some 1 and 1/2 years ago, will reconvene at Rocketdyne for a total review of the turbopump history, data and design status on Tuesday, April 28. I also plan to be there.

In the interim, all engine testing at Rocketdyne as well as Marshall, has been terminated pending a review of all the facts involved to date.

RL10 ENGINE PROGRAM

We have given to go-ahead to P&WA to start working on the reduced throat, increased Isp modification to the RL10 engine we discussed in the Management Council Meeting last week.

Dr. Greene
This problem seems to plague all LH_2 operations. Suggest you familiarize yourself with it.
B

Lee B
Mr. Bedwerth gave me a very plausible explanation on reasons for flow induced impeller failures. Suggest you talk to him, if you haven't done so already
B

B 5/4

NOTES 4-27-64 CLINE

1. LOCKHEED CONTINUING EFFORT: Contract NAS8-9500 was signed 4-24-64 and the processing of additional tasks will begin immediately. ✓

FW* 2. PROPOSED BELLCOMM DETONATION STUDY: At your direction, Dr. Lucas Chief of our Materials Division, contacted Dr. John Hornbeck of Bellcomm relative to the participation of Bellcomm in our hazards program which was discussed by you, Dr. Mueller, and Dr. Hornbeck. Dr. Lucas asked Dr. Hornbeck to designate an individual or small group to work with us in arranging the details of Bellcomm participation in this program. Dr. Hornbeck stated that he did not think Bellcomm would be able to contribute in this area with current personnel because of lack of background. Dr. Hornbeck also stated that they have no background for participation in a study of liquid-destruct systems. However, in response to question, Dr. Hornbeck stated that Bellcomm might be able to employ appropriate personnel.

Fred C. Please call me on this - I discussed it with George Mueller B

3. S-IC UMBILICALS: The prototype umbilical connector assembly and vehicle skin section required at the MSFC ground support equipment test area 4-15-64 have not been received from The Boeing Company. The failure to deliver the hardware is delaying the KSC tail service mast qualification test program. ✓

4. VEHICLE MECHANICAL DESIGN INTEGRATION WORKING GROUP MEETING: An S-IB/S-IVB Structural Interface Meeting of the Vehicle Mechanical Design Integration Working Group convened on 4-20-64. Action items were generated to:

a. Establish a new S-IV/S-IVB Structural Interface.

b. Establish requirements for a new (or modified) drill fixture to Chrysler Corporation from Douglas Aircraft Company for the "new" S-IVB Stage Interface. ✓

Fred C. See my remarks in Baker's NOTES 4/27/64 B

5. LOX PUMP EXPLODES ON INFORMAL FLIGHT RATING TEST (FRT) F-1 ENGINE: On 4-21-64 a LOX pump exploded on the informal FRT engine 019 after 111 seconds into mainstage on Test Stand 1B-1. The turbopump, suction ducts, and high-pressure duct areas were severely damaged. Damage appeared to be similar to that of the LOX pump explosion on Engine 014 in February. Rocketdyne and MSFC are investigating hardware and records for clues on the cause. Engine 019 had approximately 750 seconds total runtime. All engine tests have been stopped until further notice. Test Stand 1B-1 will be down three weeks for repair.

FW* 6. PROTOTYPE S-IC HIGH-PRESSURE HELIUM STORAGE BOTTLE: The high-pressure bottle is to be used for storage of 3,000 psi helium at cryogenic temperature (located in LOX tank) for fuel pressurization. The first prototype has successfully completed its qualification program; five production bottles have been delivered and accepted at MSFC. ✓

B5/9

CONSTAN April 27,1964

ELECTRICAL CABLE WRAPPING, S-I-10

The electrical cable that was wrapped in the tail section of S-I-10 had not been properly inspected for quality. Chrysler Corporation was directed to unwrap the cable for inspection. The inspection to the present date has revealed 97 discrepancies. These discrepancies consist of minor damage to insulation, a broken wire, a ground wire that had not been connected, foreign particles (metal chips and filings) in the cable trunks under the cable wrapping, etc. A delay of about one week in the checkout schedule may be caused as a result of the unwrapping and inspection of the electrical cable.

FWJ * REPROGRAMMING FOR VERTICAL ASSEMBLY BUILDING

A reprogramming action for providing an additional $464,000 (CofF) to The Boeing Company for the Vertical Assembly Building was approved by NASA Headquarters on April 23, 1964. Boeing will be given programming authority to proceed no later than April 29, 1964.

VIP VISIT

Mr. A. Silverstein, Director of Lewis Research Center, Cleveland, Ohio, visited Michoud Operations on April 22, 1964, accompanied by the following individuals: Mr. R. R. Godman, Office of Reliability and Quality Assurance, Mr. J. L. Sloop, Asst. Associate Administrator, Office of Advance Research and Technology, and Mr. Mahon, Agena Project Manager, NASA Headquarters. They received a general orientation and tour of the Michoud facilities and visited Mississippi Test Operations on April 23, 1964.

QUARTERLY REVIEW

The third FY-64 SIC Quarterly Technical Program and Progress Review will be held on April 28-29, 1964, at the MSFC/ Michoud Operations in New Orleans.

B 5/4

NOTES 4/27/64 FORTUNE

1. Manpower Development Training Act: will be used to fill Boeing, North American and General Electric needs for electronic and electrical technicians, draftsmen, and skilled clerical help as much as possible. Mr. Karter, Department of Labor representative, visited MSFC. Marion Kent chaired the meeting with contractor and Marshall personnel. Department of Health, Education and Welfare will approach Mississippi State Employment Commission to determine their interest in participation of Equal Employment Opportunity considerations. Department of Labor may ask NASA to contract with labor money to some firm to set up program on federal property if state will not. A Washington meeting is scheduled as soon as this has been determined.

2. Explosive Ordnance Demolition Personnel: will visit MTO Monday to determine need for and accomplish as necessary sanitation of former Navy Bombing Range. NAS New Orleans representatives looked over fragments we had found there and agreed we should call in the Navy Mining Force Atlantic Fleet EOD team to make sure no high explosive remnants were left in the area.

NOTES 4/27/64 GEISSLER B 5/9

1. Tracking Study for OMSF: The study concerning the need for on-board tracking instrumentation for Saturn IB and V is being revised. Revision became necessary due to recent decision (meeting with Dr. Mueller on 4/16/64) on Bermuda ground tracking station. ✓

2. Flight Control Operations Activities: A letter of appreciation was received from Mr. C. C. Kraft, Assistant Director for Flight Operations at MSC, thanking the MSFC Flight Control Support Group for their fine efforts in preparing and presenting the Flight Controller Orientation Course. The coordination work accomplished by Mr. Charles Casey, in particular, was acknowledged (copy enclosed). ✓

NOTES 4-27-64 GRAU B5/9

1. S-I-7 POST-STATIC CHECKOUT: Final electrical checkout of the S-I-7 stage continues in Station B, building 4708 with an estimated completion date of 4-29-64.

2. S-IU-7 INSTRUMENT UNIT CHECKOUT: The rework of Control Distributors for S-IU-7 Instrument Unit was completed and the distributors returned to this Laboratory April 23, 1964. Present checkout schedule, including Saturday work indicates checkout completion by May 16, 1964.

3. S-IV-9 CHECKOUT AT DAC, SANTA MONICA: Checkout on the S-IV-9 stage has been completed at Santa Monica, but the stage has not been shipped to SACTO due to the delay in static firing of S-IV-7 (now scheduled for today) which is still in the only available test tower. Meanwhile manufacturing continues on the S-IV-9 stage in an attempt to compensate for this delay. There are approximately 50 part shortages on the stage with 1300 manufacturing manhours required to completion.

4. MICROMETEORIOD PROJECT: Subsystem testing for the Micrometeoriod Prototype is in process at Bladensburg. An optimistic estimate for beginning installation of these subsystems into the electronic cannister is May 4, 1964. Some readjustment of schedules will be required for mating and testing the Micrometeoriod Capsule with S-IU-9 and other Saturn stages.

5. ELECTRONIC PACKAGING COURSE: An eighty-hour training course in welding for electronic packaging (module welding) was initiated in November, 1963. The course announcement was released and ten (10) students per class were scheduled on a full time basis starting in January, 1964. A total of eighty-eight (88) students have been graduated to date and classes are filled through August, 1964.

6. S-IV-B HARDWARE QUALIFICATION: At the request of the S-IV-B Office, this Laboratory will perform qualification tests on S-IV-B hardware. Test specimens will be procured by the S-IV-B Office and provided to this Laboratory for testing.

NOTES 4-27-64 GRUENE B 5/9

SA-6 Status

1. During the past week the Radio Frequency Interference Test with the service structure removed and simultaneously the stabilizer azimuth and launch vehicle alignment was completed. A discrepancy during the RFI test with service structure around the vehicle, which is still under investigation, was detected insofar that a "safe" signal on the S-IV stage was indicated in the blockhouse when it was not sent. It could not be determined whether it was caused by Radio Frequency Interference or by erroneous S-IV ground system operation. The RFI test with the service structure removed was successful and no unscheduled signals could be detected. As you know, we intended to operate the UDOP system with low power and have the radio command transmitter of the Range transmitting at highest possible power output in order to saturate the command receiver for interference signals. This operation seems safe with the exception that should the command transmitter fail, the automatic switch over to the second transmitter takes 600 m/sec. Should this failure occur when the vehicle has not completely cleared the service structure, an erroneous cutoff or destruct command could theoretically be executed. KSC, together with MSFC, is checking into the advisability of eliminating UDOP for SA-6 completely. ✓

2. During last week, the full pressurization test of the S-IV stage was successfully completed after a certain delay necessitated by the exchange of the H_2 vent valves and the lox tank pressurization valves (Sacramento accident). ✓

3. This week we intend to run our three overall system tests with the final major test, H_2O_2 loading, on May 7, which will conclude our major preflight tests except the Simulated Flight Test. ✓

NOTES 4/27/64 HAEUSSERMANN

B5/4

1. SATURN I GUIDANCE COMPUTER: (REF. Item 1. Notes of 4/20, Copy Attached*)
The failure in the guidance computer which occured during laboratory tests, 4/4, has been traced by IBM to an open circuit in a multilayer printed circuit interconnection board, rather than a system discrepancy as reported 4/20. The connections between conductors on the various layers are made by plating through drilled holes. The open circuit was found to be caused by a smearing of the epoxy in the board across the connection lands during the hole drilling operation. The "epoxy smear" prevents proper contact with the conductor when the hole is plated through.

An investigation revealed that several modules have been rejected at IBM during build-up and testing because of similar multilayer board irregularities. As a result of the problem, several changes in manufacturing techniques and 100% inspection of holes prior and subsequent to plating were initiated at IBM effective 1/1/64. However, the computers which have been delivered to MSFC contain many boards manufactured at IBM prior to that date. Since the failure rate of the questionable boards has been quite small, IBM reliability analyses show an insignificant reduction in reliability because of this single factor. Although the decrease in reliability might not be a significant amount, two possible corrective actions are being investigated: (1) replacing those boards which came from manufacturing lots from which a board was later found to be faulty and (2) replacing all boards manufactured prior to 1/1/64. IBM will furnish preliminary cost and scheduling data relative to the board exchange in two weeks. Although no change can be made in the SA-6 computer if launch schedules are to be maintained, it is anticipated that some corrective action can be implemented for SA-7 and subsequent vehicles. ✓

Since the reliability of the computer is still considered compatible with that of other portions of the system, it is proposed to fly the SA-6 guidance system closed loop as previously planned with no change in the multilayer boards. ✓

2. AROD TRACKING SYSTEM: (REF. Item 2. Notes of 4/6, Copy Attached*)
Mr. Saunders of our Instrumentation and Communication Division visited OTDA on 4/15-17 for discussions on AROD development program. As a result of these discussions and of the policy set forth by Dr. Mueller, AROD development program plans have been revised as follows:

a. All plans for testing the AROD System in conjunction with Saturn vehicle flights have been cancelled. All work underway in preparation for testing on 201 and 202 has been stopped.

b. The development of an AROD System to be tested during a vehicle flight will be continued, though at a slower pace than previously planned. The first set of hardware will be scheduled for delivery in 3/66 instead of 6/65. Action to procure this hardware will be initiated immediately.

c. The equipment to be purchased will be limited to that required for one vehicle flight test.

d. At a later date, OTDA will make arrangements for a vehicle flight on which the system can be tested.

e. Currently available FY 64 funds will be required to implement this plan. Because of this late reorientation, we have verbally asked OTDA (Morrison) for authorization to carry over FY 64 funding. OTDA indicated that they intend to reduce FY 65 funding to match this new plan.

WH I don't know whether we may not regret this AROD close-down some day! B

2 Encs:
1. Notes of 4/6
2. Notes of 4/20

*Copies of attachments provided M-DIR and R-DIR only.

NOTES 4/27/64 HEIMBURG

1. F-1 ENGINE TESTING (STATIC TEST TOWER WEST):

No tests were conducted during the week of April 20. All F-1 engine testing has been cancelled until an explanation of the lox pump explosion on engine 019 at Edwards Air Force Base is found.

2. TEST LABORATORY FACILITIES ACTIVATION DATES:

a. F-1 Engine Test Facility. Beneficial Occupancy Date (BOD) from Corps of Engineers--July 1, 1964. First hot firing--November 1964.

b. S-IC Test Facility. Joint Occupancy Date (JOD)--we are presently installing the measuring system in the east legs of the tower. Various increments of the stand will be released to MSFC as they are completed. BOD from Corps of Engineers--July 1, 1964. First hot firing (single engine)--February 1965.

c. West Area Blockhouse and Instrumentation System. BOD--July 1, 1964.

d. J-2 Engine Test Facility. BOD from Corps of Engineers for test stand and terminal building--August 1, 1964. Completion of LH_2 system--October 27, 1964. First hot firing--February 1965.

e. Addition to East Area Blockhouse. Brick and Mortar already complete for FY 1962 and FY 1963 projects. Instrumentation system for FY 1962 and FY 1963 projects--complete December 15, 1964. Instrumentation system for FY 1964 project--complete mid-1965.

B5/4

NOTES 4-27-64 HOELZER

COMPUTER PERSONNEL FOR KENNEDY: As previously reported, Computation Laboratory is working with Kennedy in establishing a large scale computing and quick-look data reduction facility at Merritt Island. Kennedy desires to continue the arrangement in using GE (Phoenix) personnel to staff their scientific computing operation. A letter is being prepared asking that the level of effort be increased from some 10 people to 75 people over the next 18 months. This request will be forwarded to you. We are in agreement with this arrangement and feel that this is the most effective manner in which to proceed. MSFC is to be reimbursed by Kennedy in order to cover the amendment necessary in the GE contract. ✓

B 5/4

NOTES 4-27-64 JAMES

SATURN I - SA-6 - The Spacecraft and launch vehicle have been electrically mated satisfactorily. (See attached picture von Braun copy only)

S-IV-6: The new vent valves with the override venting capability have been installed with one replaced because of slow closing time. Three discrepancies were observed during the launch vehicle sequence malfunction test conducted on 4-21-64; (1) a hole in the static inverter transistor (replace transistor) (2) LH_2 overfill sensor indicated a 100% overfill. (Recalibrated); (3) failed to receive an engine shut-down signal because of a bad lox injector pressure switch. (Replace switch).

S-IV-7: An attempt to acceptance fire the stage on 4-21-64 resulted in an abort at T-two minutes because of failure of the automatic countdown circuitry to achieve "S-IV ready". Test rescheduled for 4-27-64.

S-IV Development, Evaluation and Qualification Test: Several key propulsion components will not be completely tested by the SA-6 flight. These are LOX low pressure duct, cold helium solenoid, regulator and relief valve.

S-I-8: Arrived on Saturday, April 25, from CCSD and ready for erection into the static tower April 27, 1964.

S-I-10: Mr. Lowery informed Michoud that cable rework will cost some 10 days at two shifts, and predicts an approximate three week delay in the shipment of S-I-10 for static firing. Actually, Chrysler is already nine days late to checkout. Further investigations will be made.

Mission Tasks: Contracts has completed 11 actions into what will become Mod 72 to contract NAS8-4016. This will be the second group of MSFC documentation actions transferred. There are still some actions remaining including breadboard operations.

SA-10: A letter has been sent to Mr. Weidner, R-DIR, requesting that R&DO conduct a thorough investigation to determine the approach and extent of work required to refurbish, modify, and qualify for flight, the BP #9 hardware and the MMC capsule support and separation system in order to support the SA-10 flight schedule. MSC (Shea) indicated by phone (4-27-64) a strong desire for this effort to be done in-house at MSFC.

SATURN IB - Uprating Isp of H-1 Engine: The Engine Project Office and S-IB Stage Manager were requested to proceed with actions toward uprating the Isp of the H-1 Engine. General Phillips has given me informal go-ahead on this item. (Do not report to Headquarters)

Fire-in-the-Hole: Based on the results of a brief P&VE study, a memo was sent to appropriate elements recommending that all effort on the Saturn I or IB Fire-in-the-Hole studies be terminated.

IB IU Problem: The Saturn IB Instrument Unit RF problem is caused by poor metal-to-metal contact. R-P&VE is evaluating the problem for possible structural modifications. to improve grounding.

Cold Plates: Cold plates from AVCO should be available by June 1 for S-IU-200V. Hamilton Standard (backup source) has delivered their first cold plate and visual inspection indicates it to be of good quality. Hamilton Standard is to continue to manufacture cold plates on existing development contract.

IBM Contract: RFQ preparation for IU prime contract is proceeding on schedule for May 1, 1964, release to IBM.

NOTES 4-27-64 Koelle B5/4

No NOTES this week.

B 5/4

NOTES 4-27-64 KUERS

1. Quality Assurance of Workmanship: Quality of workmanship must be built into the hardware--after having been designed into it. Building quality into hardware is accomplished by development of a sound manufacturing concept and plan; by selection and development of optimum manufacturing processes; by designing good tools and fixtures; by selection of proper manufacturing equipment; by provision of proper facilities and environment for fabrication; and finally by training and supervision of manufacturing personnel. All these functions fall under the responsibility of the manufacturing organizations of the prime contractors and the ME Laboratory at MSFC. I believe that the present practice of forcing the manufacturer to use MSFC manufacturing process specifications, written by specification writers of R-P&VE and R-QUAL, is not the right concept of controlling quality of workmanship. My opinion is based on the following principles:

a. We should not dilute the responsibility of the manufacturer by trying to prescribe in every detail how to do the work.

b. There are also other, and sometimes better, processes and methods applicable than described in MSFC process specifications.

c. We should manage by exceptions rather than by trying to prescribe and supervise details of the conventional manufacturing techniques.

d. MSFC should concentrate its efforts in analysing and qualifying new methods of manufacturing such as: explosive forming; age forming; out-of-position welding; wire wrapping; electron beam welding; etc.

I have discussed these ideas with Mr. Grau and Mr. J. C. Condon, Director, Reliability and Quality Assurance, NASA Headquarters. We have tentatively come to the agreement to recommend that process specifications should not be mandatory any more but would be used in the future only as a guide and recommendation to the manufacturer. This concept requires further clarification with P&VE, Astrionics, and IO. We should then also discontinue any training of contractor personnel and discontinue review and approval of contractor generated process specifications. The whole concept of control by process specifications is, in my opinion, coming from mass production techniques with fine breakdown of operations and utilization of unskilled labor.

Billy Wuzzek

How do you feel about this?

B

2. Visitors: Mr. Ralph Ruud, President of Los Angeles Division, North American Aviation, and Mr. George Lewis, Saturn Program Manager, Los Angeles Division, North American Aviation; Mr. J. Wright, President of Federal Mogul Bower Bearings, Inc., Mr. S. MacAuthor, Treasurer and Group Manager, Federal Mogul Bower Bearings, Inc., and Mr. W. Camp, General Manager, Arrowhead Products, a division of Federal Mogul Bower Bearings, Inc., visited us.

NOTES 4-27-64 MAUS B5/4

1. APOLLO DOCUMENTATION MANAGEMENT REQUIREMENT TASK TEAM - General Phillips has called a meeting of the Apollo Documentation Management Requirement Task Team for April 28-30 in Washington. MSFC representatives will be the working group formed last week for this purpose: Frank Magliato of R&DO, John Stone of IO, and C. E. Andressen, working group chairman. ✓

2. HEADQUARTERS REVIEW OF MSFC POP R&D 64-2 - MSF has scheduled a series of reviews with centers on the R&D Program Obligation Plan 64-2. The MSFC review is scheduled for May 4 at MSF. However, only five headquarters people will be involved, so we have requested by TWX that the review be held here instead. ✓

3. DIRECTOR'S REVIEWS BY STAFF OFFICES - The Financial Management Office, Technical Services Office, and Management Services Office, have completed their Director's Reviews presentations to Mr. Gorman. The schedule for this week has been revised due to Mahon/Ford visit. Schedule for remaining reviews:

April 27	2:30-4:30	Purchasing Office
April 30	1:30-3:30	Personnel Office
May 1	9:00-11:30	Facilities and Design Office ✓

4. VISIT BY KELLY COMMITTEE - June 4 has been established as the date for the visit by the Kelly Committee to MSFC. This group is known as the Management Advisory Committee to the Associate Administrator for Manned Space Flight. Paul Cotton is coordinator for headquarters; Ray Kline for MSFC. ✓

5. REPORTS SURVEY REQUESTED BY PRESIDENT JOHNSON - We are required to make a flash report to headquarters today on anticipated results of this survey. This study does not relate to internal reporting, but is limited to those reports from public-industry institutions to the government. Other deadlines are:

May 7	Part I	(Reports approved by BOB, under Federal Reports Act)
June 12	Part II	(Inventory of other NASA recurring reports from contractors, organizations, etc., not approved under Federal Reports Act.) ✓

NOTES 4-27-64 McCartney B 5/4

1. MANPOWER PLANNING: My Operations Engineering Group has revised the present Manpower Authorizations to reflect total manpower resources (Civil Service and Types A and B Contractors) now available to each R&D Operations element. Today, we will issue the revision, plus a two-year Manpower Plan document. Each laboratory and office will continue to study the plan and indicate program assumptions which support proposed changes to present manpower resources.

2. FY-66 CofF BUDGET: Representatives from MSF will visit Marshall this week to familiarize themselves with our proposed FY-66 CofF projects. My Facilities and Materials Group is coordinating the visits and will arrange for laboratory participation as required. We have been advised that the FY-66 CofF Budget will be presented to the MSF Facilities Review Board on May 5.

3. SRT FY-64 REPROGRAMMING: The proposed $1.9M reprogramming actions required to complete the total SRT FY-64 program are still pending. Mr. Newby is to visit Headquarters this week to resolve the problem. My office has completed a listing of the tasks with RPL concurrence that will be funded with Saturn IB and V funds when the necessary reprogramming approvals have been obtained.

4. ADVANCED STUDIES INITIATIONS: Initiations are now complete for all Advanced Studies (OMSF and OART). A total of $9.05M has been initiated: $8.9M for OMSF and $0.15M for OART.

5. LOGISTICAL AND MAINTENANCE PLAN FOR RCA-110 SATURN OPERATIONAL COMPUTER SYSTEMS: At the request of Astrionics Laboratory, my office is investigating with IO the feasibility of contracting for logistics and maintenance support for RCA-110 Saturn Operational Computer Systems. Since delivery of the RCA-110 prototype system in 1960, Astrionics has provided such support. However, steadily increasing program needs will soon exceed the Laboratory's capabilities. We are working closely with Astrionics and IO on this matter.

NOTES 4/27/64 RUDOLPH B 5/4

1. Saturn V Financial Status - The status as of April 23, 1964, is: (1) Annual plan without supplement - $681.1 M, (2) Initiations - $640.5 M (94%), (3) Obligations - $531.2 M (78%). We are continuing to encounter difficulties with obligations in contracts under purview of the Purchasing Office. Initiations to the Purchasing Office equal $161.6 M. Obligations by the Purchasing Office equal $88.3 M. We will not be able to obligate our funds within this area unless there is an immediate improvement in performance. This has been called to the attention of the Executive Staff.

2. Configuration Management - A contract was negotiated with STL on April 23, 1964 for effort covering (1) Review and evaluation of the MSF Configuration Mgmt Manual, (NASA version of AFSC Manual 375-1), (2) Reveiw and evaluation of MSFC Configuration Management System in effect today and (3) Development of an MSFC implementation plan in compliance with the MSF Configuration Management Manual. The total negotiated price was $69,750. STL will have personnel on board at MSFC by May 4, 1964 to commence the study. The study will cover Saturn IB Project as well as Saturn V. ✓

3. S-IC Intertank - Resolutions of the S-IC Intertank structural problem has been effected without a schedule slip for the flight stages. The interim design will result in an estimated weight increase of 2400 pounds. A new design will be effective not later than S-IC-4. ✓

4. S-II Stage:

Vertical Checkout Facility at Seal Beach - $1.0 M of FY '64 S-II Facility funding has been released and sent to the Navy for construction of the vertical checkout facility at Seal Beach. ✓

Telemetry - During the S-II Vehicle Instrumentation Working Group Meeting held April 21-22, 1964, S&ID indicated that no additional EO's or changes can be made in any telemeter equipment or associated GSE checkout equipment. A day-to-day slippage in schedule will occur on any additional EO's. ✓

5. Instrument Unit:

IBM, Prime Contract - The IU Prime Contract Procurement Plan Amendment was signed by Mr. Webb on April 16, 1964. ✓

Cable Rack - The IU Cable Rack design was released to ME Lab on April 17, 1964. Two Cable Racks are in the process of fabrications. ✓

NOTES - 4-27-64 - SHEPHERD B 5/4

No notes.

NOTES 4-27-64 Stuhlinger B 5/4

1. VISIT BY DR. BISPLINGHOFF: RPL invited Dr. Bisplinghoff to Huntsville for a detailed technical status report on the MMC Project. This report will cover the mechanical systems, electronic systems and the meteoroid detector systems. It will give current status, outline current problems and indicate our approaches to solutions. It is expected that this visit will take place during the last half of May. It would be greatly appreciated if you could attend this briefing. E.S. Talk to! B

2. SRT PROGRAM STATUS: The status of the SRT program managed by RPL is, as of April 24, as follows:

	ANNUAL PLAN	AUTHORIZED	PROCESSED TO FMO	OBLIGATED
OART	10,498,000	10,498,000	10,364,000	1,999,700
OMSF	14,163,000	14,133,000	13,960,256	587,000
OSSA	675,000	675,000	665,859	17,265
	25,336,000	25,306,000	24,990,115	2,603,965

3. PAYLOADS FOR S-IB: On April 22, a meeting was held between H. Weidner, F. Williams, and members of R&DO Laboratories on the planning of technological and scientific payloads for S-IB. Three major classes of payloads were defined:

a. Existing spacecraft, to be carried by S-IB (Surveyor). Twin-

b. Spacecraft to be designed for S-IB (Voyager; meteoroid capsules; SNAP testing; electrically propelled spacecraft).

c. Basic Bus for composite scientific and technological payloads.

It was decided that RPL should establish a "shopping list" of classes (b) and (c) payloads. A list of "recommended" payloads, with some details of design trajectories, guidance, power, communications etc., will then be developed as a joint effort between R&DO Laboratories. Dr. Bisplinghoff expressed the desire to be given a presentation on S-IB payload capabilities as soon as practical. It is expected that R&DO will give this presentation in about two months. E.Z. Gray will also be kept informed of the progress of this effort.